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THE CANADIAN
ENTOMOLOGIST.

VOLUME XIV.

Edited by William Saunders,
LONDON, ONTARIO.

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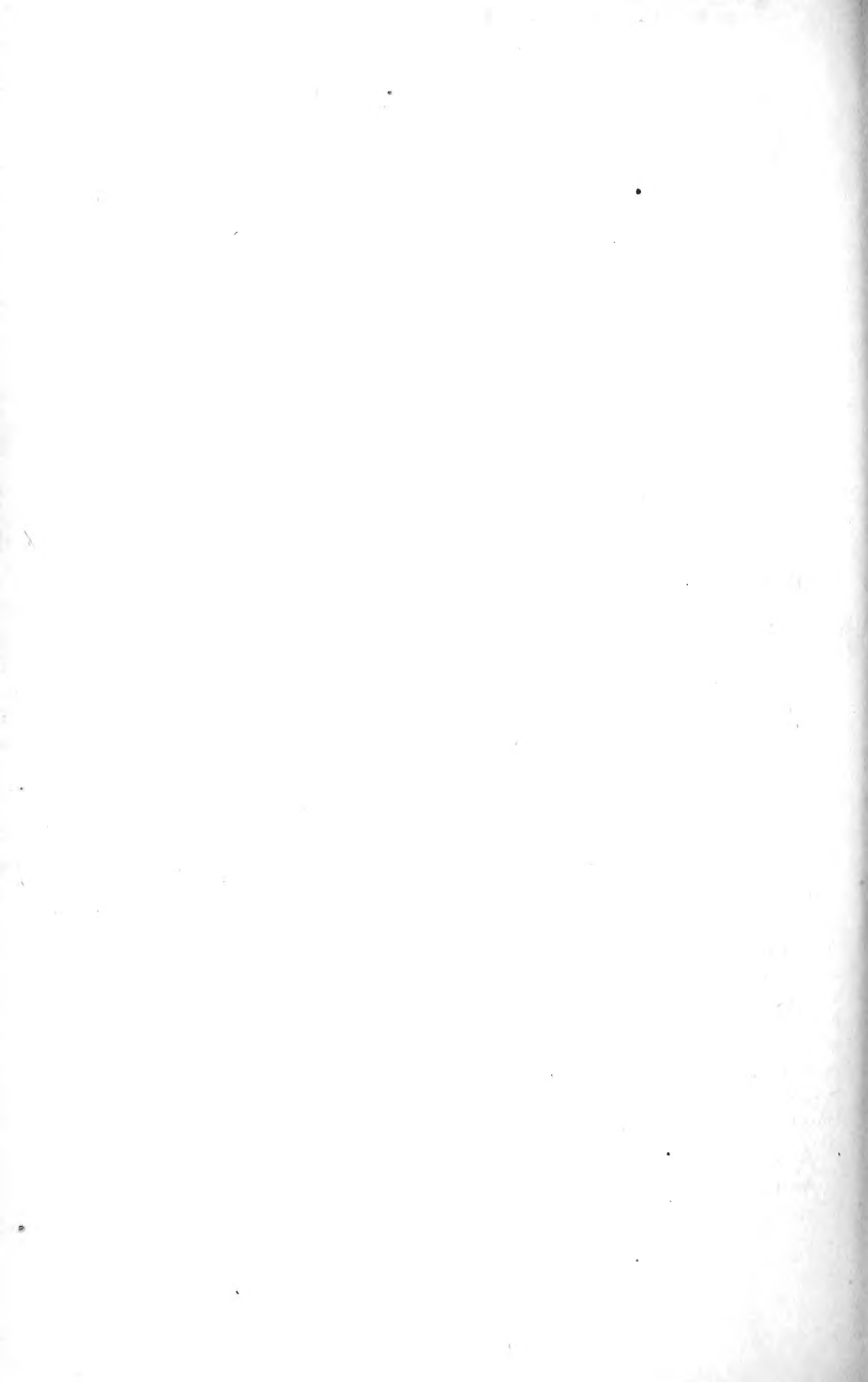
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No. 1

ENTOMOLOGY FOR BEGINNERS.

THE SOUTHERN CABBAGE BUTTERFLY—*Pieris protodice*.

BY THE EDITOR.

In figure 1 we have represented the male, and in figure 2 the female of the Southern Cabbage Butterfly, an insect by no means confined to the South, although much more abundant there than in the more northerly portions of America. This insect enjoys a wide geographical distribution, extending south-west as far as Texas, west to Missouri, north-west to the Red River, and along the east from Connecticut to the Southern Atlantic States. A few

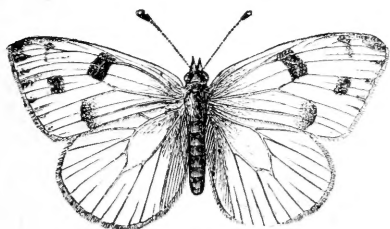


Fig. 1.

years ago it was not uncommon around London, and occasionally quite plentiful about the shore of Lake Erie at Port Stanley; but of late years it has become a rare insect with us, and we have not met with a specimen on the wing for several years. The English Cabbage Butterfly, *Pieris rapæ*, seems to have taken its place entirely.

The butterfly is a very pretty one, as will be seen by the figures. The ground color in both sexes is white, with black spots and black and dusky markings which are much more numerous in the female than in the male. Although so rare in Ontario that it has never, as far as we know, been reported as injurious, it is frequently very destructive to the south of us. According to Mr. Riley,

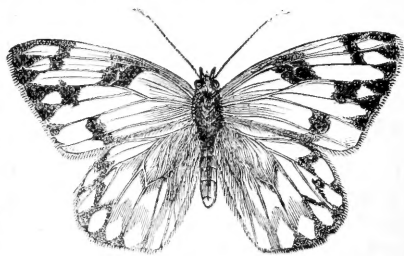


Fig. 2.

it is abundant in Missouri, and often proves exceedingly injurious, sometimes destroying in a single district thousands of dollars worth of cabbages.

The caterpillar, when full grown (figure 3, *a*), is about an inch and a

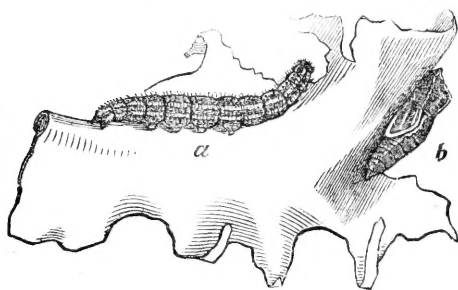


Fig. 3.

quarter long, of a bluish-green color, with four longitudinal yellow stripes and many black dots; when first hatched it is of an orange color with a black head. The chrysalis, shown at *b* in the figure, is about seven-tenths of an inch long, of a light bluish-grey color speckled with black, with the

ridges and prominences edged with buff or flesh-color, and having larger black dots.

The insect hibernates in the chrysalis state, and where common may be found on the wing during the months of July, August and September.

DESCRIPTIONS OF TWO NEW SPECIES OF N. AMERICAN BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

CHIONOBAS VARUNA.

Male.—Expands 1.6 to 1.75 inch.

Upper side brown, individuals varying from yellow to red and black-brown, but in the examples under view red predominates; costal edge of primaries dark brown, next base dusted with white; apex and hind margin edged with dark brown, which fades insensibly into the ground color; beyond the disk, one to four small black ocelli; where one only is present, it is on the upper discoidal interspace; where two, the second is on lower median interspace; where all are present, the two extreme are large and about equal in size, the interior pair minute.

Secondaries have a narrow brown border, clearly defined on inner side; all the nervures and branches edged with dark scales; the ocelli

are from nil to five, small, black ; when all are present they stand one on each interspace from subcostal to lower median ; fringes of primaries mixed light and dark brown, of secondaries mostly light.

Under side of primaries paler, the tint varying as above ; over costa, apex and over hind margin to the ocelli, sprinkled with light brown and white ; in some examples the white disappears below median nervure ; in the cell the brown lies in transverse streaks, and near the outer end are two whitish patches ; along the edge of hind margin a white dot in each interspace ; the ocelli repeated, enlarged and pupilled with white ; in one example, which has but one ocellus above, there are three below, one being on second discoidal, the other on second median interspace.

Secondaries light and dark brown and white, or almost wholly dark brown ; the basal area often dark to middle of cell, in sub-concentric curves about base, intermingled with streaks of white, but in other cases is nearly solid dark brown ; across disk a narrow dark band, the outer side well defined, the basal side not so distinctly, as the curved stripes, or the basal color, tend to coalesce with it ; but when most distinct this inner side is pretty evenly excavated ; on the outer side there is a rounded prominence opposite cell, posterior to which the outline is wavy to inner margin, and anterior there is a single curve to costa ; this band is dark brown upon both edges, and in some examples is wholly dark, in others it is lighter colored within, and with a little white ; beyond the band, the ground is either white, thickly dusted and streaked with brown, most so along the line of the ocelli ; or wholly uniform dark brown with a little dusting of white ; along the margin white dots like those of primaries ; the ocelli are five, nearly equal and pupilled white ; in one they are minute and the spot next outer angle is wanting.

Body black-brown ; below, thorax black, abdomen gray-brown ; legs light brown, with gray ; palpi brown with black hairs ; antennæ fuscous above, dull white below ; club orange below and at tip.

Female.—Expands 1.8 to 1.9 inch.

Closely like the male, the color varying in same manner ; the marginal borders are both distinctly cut on inner side ; the ocelli on primaries run from two to four, on secondaries are five, all usually blind, but sometimes the anterior ocellus on primaries and the second and fifth on secondaries have white pupils.

Under side as in male ; white dots along both margins as in the male.

From 6 ♂, 4 ♀, taken by Mr. Morrison on the plains of Dacotah Terr., May, 1881.

Varuna belongs to same sub-group with *Uhleri*, Reak.; the fore wings, especially of the male, being narrow and produced. On the under side *Uhleri* is very white. Mr. Reakirt described the hind wings as "marbled with irregular markings of white, black and brownish scales, sometimes congregated into spots; at others, disposed in transverse lines, the darkest portions nearest the base, the color decreasing outwards; the waves from the outer border of the transverse band (up to base) are so interlaced and contiguous as to preclude all possibility of tracing any inner outline to this band; this outer is more distinct, yet not nearly so well or clearly defined as in the allied species; the reticulations appear to be diffused over the whole surface."

This description was made from a single pair taken by the late Mr. James Ridings, on Pike's Peak, in 1864, and late in the year, as to my knowledge, Mr. Ridings did not begin to collect before last of August or September. The expanse of the ♂ is given as 1.75 inch, the ♀, 1.69. Since that date many examples have been brought in, and the species is not uncommon in collections. It varies greatly. I have 11 ♂, 3 ♀, in my own collection. All are larger than Mr. Reakirt's specimens seem to have been, the smallest ♂ expanding 1.7 inch, the largest 2.05. The average expanse of the 11 is 1.88 inch. The females expand 2.1, 2.15, 2.2, averaging 2.15 inch. On the other hand, my *Varuna* males run from 1.6 to 1.75, averaging 1.7 inch; and the females average 1.88. *Varuna* therefore is considerably the smaller of the two.

It is also darker colored on upper surface, being red-brown most often, less commonly yellowish, while *Uhleri* is pale yellow-brown, and sometimes decidedly whitish—though I have one which is red-brown, plainly an exceptional case, as out of many which have passed through my hands, this was saved as the only dark one.

In the ocelli, their number and shape, the two species are alike.

On the under side, *Uhleri* is white, that being the predominating color on the hind wings especially. In 6 ♂, there is no trace of a band, the brown waves, as Reakirt calls them, being distributed pretty evenly over the whole surface, sometimes much broken, or macular; in one of these the brown is almost obsolete, and the surface is white with some fine streaks and a dusting of brown. In 5 ♂, there is a concentration of the waves upon the disk and basal area so as to give an indistinct band, the

brown and white being interlaced in about equal proportions. If anything, the white predominates from the outer edge of the band to base; in 2 of the 5, while the band is thus outlined, all the rest of the wing to hind margin is white flecked with fine streaks or dusted.

The 3 ♀ are yellow above, two of them with less white below than any of the males; the other has the macular surface and no band. Of the two, one has the area from base to outer side of the band evenly reticulated brown and white, and the other is macular over the same area; so that in neither is there an inner side to the band. Wherever in both sexes there is an approach to a band, it is very unlike the dark band usually seen in this genus. In all the *Varuna*, also, there are distinct white points on both hind margins on under side, and I find nothing of this in *Uhleri*.

Mr. Morrison writes: "This *Chionobas* was taken in Dacotah Terr., on my way to Montana, in May. It was found on the plains, elevation about 1,200 feet, and in all about 100 specimens were taken. All the *Uhleri* I have taken were in mountains, never at less than 5,000 feet elevation, and from that to 11,000 feet, and only in July and August."

Mr. A. G. Butler, Cat. of Satyridæ in B. Mus. Col., 1868, gave *Chionobas* (*Oeneis*) *Tarpeia*, Esper., Eu. Schmett., pl. 83, as belonging to Arctic America. It has occurred to me that the form I call *Varuna* might be that which Mr. Butler had in view. Esper's figure represents a species shaped, colored above, and ocellated after the manner of *Uhleri*, but I should not take the under side to be that of any of the American forms. But the figures are too coarsely done to enable small differences to be distinguished. The butterfly *Tarpeia* I have not seen.

ANCYLOXYPHA LENA.

Male.—Expands 1.1 inch.

Upper side dark brown, glossy; primaries have three small white spots, with traces of a fourth, in an oblique bar from costa, at four fifths the distance from base to apex; a small spot in cell near outer end; and three minute spots in median and submedian interspaces, two being in the latter, these about three fifths the distance from base to hind margin. Secondaries immaculate. Fringes concolored.

Under side of primaries dark brown, grayish at base and over apical area, more particularly when seen obliquely. Secondaries gray-brown, caused by a uniform sprinkling of whitish scales over the brown surface;

without spot except a transverse abbreviated white dash on middle of disk.

Female.—Expands 1.15 inch; color of the male; the white spots conspicuous, forming a discal row quite across primaries; a large spot in cell, and a small one in submedian interspace near base. Under side of both wings as in the male, except that the three costal spots of discal row are repeated, and the spot in cell, but all are reduced.

From 1 ♂, 1 ♀, taken in Montana by Mr. Morrison, 1881. In all 4 examples were taken.

LIST OF BUTTERFLIES TAKEN BY H. K. MORRISON IN DACOTAH AND
MONTANA, 1881.

Papilio Zolicaon, Bois.	Thecla Acadica, Edw.
Pieris Protodice, Bois.	“ Smilacis, Bois.
Colias Philodice, Godt.	“ Titus, Fab.
“ Eurytheme.	Chrysophanus Dione, Scud.
form Keewaydin, Edw.	“ Helioides, Bois.
Argynnis Cybele, Fab.	“ Rubidus, Edw.
“ Aphrodite, Fab.	Lycaena Saepiolus, Bois.
“ Nevadaensis, Edw.	“ Lupini, Bois.
“ Edwardsii, Reak.	“ Melissa, Edw.
“ Myrina, Cram.	“ Aemon, West.-Doubl.
Euptoieta Claudia, Cram.	“ Pseudargiolus, Bois.
Melitaea Acastus, Edw.	form Violacea, Edw.
Phyciodes Carlota, Reak.	“ Comyntas, Godt.
“ Tharos, Drury.	Ancyloxypha Lena, Edw.
Limenitis Weidemeyerii, Edw.	Thymelicus Poweschick, Parker.
“ Disippus, Godt.	Pamphila Pawnee, Dodge.
Coenonympha Inornata, Edw.	“ Uncas, Edw.
Satyrus Nephele, v. Olympus, Edw.	“ Cernes, Bois.
“ Meadii, Edw.	“ Metacomet, Harr.
“ Charon, Edw.	“ Delaware, Edw.
“ Silvestris, Edw.	Amblyscirtes Vialis, Edw.
Chionobas Varuna, Edw.	Pyrgus Tessellata, Scud.
Thecla Humuli, Harr.	“ Scriptura, Bois.
“ Strigosa, Harr.	Thanaos Persius, Scud.

FIELD NOTES—1881.

BY W. H. HARRINGTON, OTTAWA, ONT.

The earth covered by its first mantle of snow reminds one that the collecting season is virtually ended, and the lengthening evenings allure one to the study fireside to go carefully over note books and collections and to read the recorded labors of fellow Entomologists.

A few memoranda from my own note book may perhaps not be barren of interest to some of the less experienced readers of the ENTOMOLOGIST. I find that almost the first insect of spring was the Mud-wasp, *Polestes annulatus*, which appeared with a few flies and spiders about the 15th of March. This wasp is very abundant here, and from the pulverized macadam of the streets thousands of its mud cells are constructed every summer under the window-sills and numerous cornices of the Parliament Buildings, about which the wasps linger until the end of October. Toward the end of March a few bees and a number of small beetles, as *Amara interstitialis*, appeared. *Pieris rapæ*, the cabbage butterfly, was observed on April 1st, but from this date to the 8th of the month a severe cold spell (thermometer touching zero) reduced insect appearances to the minimum again. At its conclusion they emerged in still greater variety and number; *Vanessa antiopa* flitted about in sunny glades of the wood; *Cicindela purpurea* enlivened the fields, and its relatives, *C. vulgaris* and *C. sex-guttata*, the roads. Mosquitoes came in full force a fortnight later, and on the 24th I obtained a number of Buprestidæ upon young pines, viz., 1 ♂ and 2 ♀ *C. virginiensis*, and 14 ♂ and 13 ♀ *C. liberta*. I was somewhat surprised to find them so early in the year, yet could have taken many more. They were generally paired, in several instances copulating. Some *Pissodes* were also seen, and these were with few exceptions copulating. Great numbers of Saw-flies were also upon the pines. A few days later I captured specimens of *A. striata*, and by the beginning of May all orders of insects were well represented. On the 6th *Serica sericea* was abundant on the foliage of wild gooseberry bushes. *Chrysomela elegans* was also unusually numerous, but I could not find upon what it fed. *Platycerus quercus*? was found eating the buds of maples and other trees. The buds were often completely eaten out, and the beetles hidden from view therein. In some buds a male and female were found copulating. This beetle was new to my collection, but I found them frequently again

during the summer when using a beating net. During May the curious larvæ of certain Lampyridæ were often seen in damp woods, crawling on the trunks of trees, such as cedar, or affixed by the tail to the bark, undergoing their metamorphoses in a similar manner to the larvæ of the Coccinellidæ. Some reared at home emerged as *Photinus angulatus*. The larvæ, and to a less degree, the pupæ, emitted a strong greenish glow from two of the posterior segments; the imago being, of course, one of our common "fire flies." Some of the larvæ were thickly covered beneath with small ticks, of a bright vermilion color, which had their pointed heads plunged between the armored segments of the larvæ. They were not easily dislodged, but walked rapidly when free. By these little parasites the larvæ were so weakened as to perish before completing their transformations. The warm weather of mid-May brought forth increased hosts of insects, and the sultry air, especially in the neighborhood of lumber yards, swarmed with Scolytidæ, etc. Toward the end of the month I took a trip, with three friends, to the Wakefield Cave, about twenty miles north of the city; and in my spare moments collected a number of insects in that vicinity. Cicindelidæ especially abounded on the sandy hill-side roads, and I captured three species which are rare, or not found about here, viz., *C. 12-guttata*, *C. longilabris* and *C. limbalis*. On my way back I took a specimen of *C. sex-guttata* having only two spots (the anterior one on each elytron). Although called Six-spotted Tiger Beetles, very many have eight spots, and specimens with ten spots are frequently taken. In a beech grove at Chelsea, *Ithycerus curculionides* was very abundant; several could be seen on nearly every tree; many pairs were copulating. Where do the larvæ live? On the 31st of May several specimens of *C. Harrisii* were taken on pine saplings, and *H. pales* and its long-snouted relatives were in full force. On June 4th, *Saperda vestita*, *Oberea amabilis*, *B. nasicus*, *C. nenuphar*, *A. quadrigibbus*, and many other weevils, elaters, etc., were noted. At an excursion of the Ottawa Field Naturalists' Club to Montebello (45 miles down the river), on 26th June, I captured 129 species of Coleoptera, a considerable percentage of which were new to me. Carabidæ were particularly abundant under drift-wood and dead leaves on the damp, shady shore, and 35 species were taken. Chrysomelidæ, Elateridæ and Curculionidæ were next in number with 15, 13 and 13 species respectively. After midsummer my opportunities for collecting were few, and my notes correspondingly scanty. I will merely mention the capture at Aylmer and Hull, on Oct. 2nd, of *Aletia*

argentata, the cotton moth ; both specimens were in perfect order, not in the least rubbed or worn. In Oct., 1880, I took several specimens about the city, also apparently recently emerged.

TWO NEW SPECIES OF ISOSOMA.

BY G. H. FRENCH, CARBONDALE, ILL.

ISOSOMA ALLYNII, n. s.

Female.—Average length .10 of an inch. Color of body and antennæ uniform black, the first with a slight greenish lustre. Head about .025 of an inch wide, about two thirds as long ; the antennæ a little enlarged at the ends, hairy, microscopic hairs moderately scattered over the head and thorax. Thorax, as well as head, punctured ; wings hyaline, dotted over with microscopic hairs, the thorax in its widest part about the width of the head. Abdomen gradually tapering from near the base, the ovipositor slightly exerted. The color of the legs vary slightly ; in five specimens the anterior and posterior legs have the femurs fuscous except at the ends ; the tibiæ with basal half fuscous, the rest yellow ; the terminal joint of tarsi fuscous, the rest yellow ; the middle pair of legs are yellow throughout except the terminal tarsi. Two specimens have all the femurs fuscous, yellow at the ends. One specimen has all the femurs pale red, and the tibiæ fuscous, but this is probably a change from yellow by the poison bottle used in killing. One is marked like the first five, with the yellow replaced by pale red ; another is like the first five, except that the middle tibiæ are a little clouded at base.

Male.—In this sex the body, wings and antennæ are colored like the females, but the antennæ are a little more slender at their ends. The head and thorax have about the same measurements, but the abdomen is a little shorter, the whole insect being from .06 to .07 of an inch. The legs have all the femurs yellow, front tibiæ yellow, middle and hind tibiæ fuscous, except at the apices, which are yellow ; feet as in the females.

Larvae.—These are found inside stalks of growing wheat in Southern Illinois, before the ripening of the grain, and in the straw and stubble during the rest of the summer. They are found mostly in the interior of the first and second internodes below the one supporting the head, usually singly, but sometimes more than one in the same internode. They pro-

duce no swelling or gall, as do the larvæ of *I. Hordei*, but feed upon the soft tissue of the interior of the stalks. They are about .15 of an inch long, rather slender, tapering slightly toward either end, footless, but when in motion seeming to have the power of pushing out the substigmatal portion of the segments, a distinct transverse head about two thirds the width of body, with a pair of brown jaws. Color yellow, approaching a pale orange.

Pupæ.—These vary from about .08 to .12 of an inch long, are black and of the usual hymenopterous form. About four fifths of the larvæ observed changed to pupæ and produced the imago, or died, the past season from July 20th, when the first imago was found, to August 20th, or perhaps better, underwent their changes between July 8th and August 20th; but I think this the effect of the dry season. Those examined the last of November were in the pupa state in the interior of the stalks down close to or in the substance of the joint, both in the fields and in my breeding jars. Those were in the larva state the last of August. It is probable they pass the winter in the pupa state under ordinary circumstances to produce the imagines in the spring, and that those hatching during July and August perish without ovipositing.

Described from 10 females and 4 males.

I take pleasure in dedicating this species to Robt. Allyn, LL.D., President of the Southern Illinois Normal University, as a slight acknowledgment of valuable aid and encouragement he has rendered me in my work.

ISOsOMA ELYMI, n. s.

Length .07 of an inch. A little more slender than the preceding; width of head and middle of thorax .02 of an inch. Color black without metallic lustre. Head and thorax very sparsely covered with hairs; antennæ scarcely enlarged at the ends; wings hyaline, microscopically hairy; legs rather more slender than in the preceding species, or in *I. Hordei*, all fuscous throughout, except that the joints are a little pale. Abdomen about as in the other species, the ovipositor slightly exerted.

Larvæ.—These are found on the interior of the culms of *Elymus Canadensis* in about the middle internodes of the stalks, very much as the larvae of the preceding species are to be found on the interior of wheat culms. While, however, the wheat larvae are generally just above the joint, these may be found in any part of the interior of an internode.

Both feed upon the soft tissue of the interior of the stalk, and do not produce any enlargement; the only noticeable effect from the outside is that internodes containing larvae are usually shorter than others. The larvae are footless, about .10 of an inch long when still, and .04. wide in the widest part, tapering to the extremities; the head transverse, about two thirds as wide as the body in its widest part, with two brown jaws. Color very pale yellow. Like the preceding, there appear to be slight projections from the sides of the body at times.

Pupa.—At the time of writing this, December 12th, all the specimens I have are in the larva state. A few went through with their transformations during the summer, but a much smaller number than of the preceding species. August 30th, two specimens of the imago were obtained from culms, having gnawed their holes of egress nearly large enough to emerge, but one was so injured in cutting open the stalk that it was not preserved. The form and color of pupa can only be guessed from the empty cases of those found in the culms.

Described from one female specimen found hatched in a stalk of *Elymus Canadensis*, August 30th, 1881.

THE OLDEST FIGURES OF NORTH AMERICAN INSECTS.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The *Gazophylacium* of Jacob Petiver, Apothecary in London (died 1715) is a very rare book, as the plates and the catalogues were printed and published at different times between 1695 and 1715. They were collected later and published by Mr. Empson, an officer of the British Museum and a natural son of Sir Hans Sloane, in 1764, in London, with the title, "*Jacobi Petiveri Opera, etc., or Gazophylacium, 2 vol. fol.*" A small volume in 8vo contains the original sheets published by Petiver between 1695 and 1706. The library of the Museum of Comp. Zool. at Cambridge possesses a copy presented, June 1765 by Emanuel Mendez da Costa, Librarian of the Royal Society, to Thomas Knowlton. The collection of J. Petiver, at least the Lepidoptera, is still preserved in the British Museum, and was seen by me in 1857. Every butterfly is placed between two thin plates of mica, fastened with a small

band of paper around the margin, and glued with one flying slip to the pages of a book in quarto, so that every species can be examined above and beneath.

Perhaps it is of some interest to know the names of the insects represented in the Gazophylacium, the more as many of them are quoted by Linnaeus. Some are well represented, many of the others recognizable.

Plate 2, figure	2.	<i>Buprestis rufipes</i> ?	Maryland.
" 3,	"	3.	<i>Neonympha eurytris</i> . Maryland.
" 3,	"	2.	<i>Deiopeia bella</i> . Carolina.
" 6,	"	6.	Perhaps a <i>Tenthredo</i> . Carolina.
" 6,	"	12.	<i>Limenitis spec.</i> ? Carolina.
" 7,	"	6.	Basket from <i>Oiketicus</i> . Carolina.
" 7,	"	10.	<i>Colias caesonia</i> . Carol.
" 10,	"	4.	<i>Alaus oculatus</i> . Virginia.
" 13,	"	10.	<i>Mutilla spec.</i> Virginia.
" 14,	"	5.	<i>Actias luna</i> . Maryland.
" 15,	"	1 & 2.	<i>Libellula trimaculata</i> , mas. fem. Maryl.
"	"	9.	<i>Limenitis disippus</i> . Carol.
" 17,	"	2.	<i>Tortrix spec.</i> Maryl.
"	"	7.	<i>Callimorpha militaris</i> var. <i>contigua</i> . Maryl.
"	"	8.	<i>Callimorpha interrupto-marginata</i> . Maryl.
"	"	11.	<i>Disonycha glabrata</i> . Maryl.
"	"	12.	<i>Thyris lugubris</i> . Maryl.
" 24,	"	10.	<i>Strategus antaeus</i> . Maryl.
" 25,	"	11.	<i>Cerambycid</i> ? Carol.
" 26,	"	11.	<i>Coleopteron</i> ? Maryl.
" 27,	"	3.	<i>Clytus Robiniae</i> . Maryl.
"	"	7.	<i>Passalus interruptus</i> . Maryl.
"	"	8.	<i>Phanaeus carnifex</i> . Maryl.
" 32,	"	5.	<i>Eudamus Lycidas</i> . Carol.
"	"	7.	<i>Haemaris thisbe</i> . Carol.
" 33,	"	3.	<i>Epilachna borealis</i> . Maryl.
"	"	5.	<i>Vanessa Huntera</i> . Maryl.
"	"	11.	<i>Erebia Portlandia</i> . Carol.
"	"	9.	<i>Cicindela purpurea</i> .
" 71,	"	3.	<i>Lebia spec.</i> Carol.
"	"	4.	<i>Cassida spec.</i> Carol.

The second volume contains the *Pterigraphia Americana* on 20 plates (Ferns, Mushrooms, etc.), published perhaps 1708. There are many insects, mostly from the Antilles. But there are also a number of undoubtedly N. American insects among them.

Pl. 11, fig. 10. *Pyrgota undata*? 11. Dipteron. 12. *Tabanus*. 13. *Musca*. 14. 15. *Mutilla*.

Pl. 12, 11-15. *Diptera*.

Pl. 13, 1. *Thalessa lunator*. 2. *Ophion*. 3. *Sirex*. 4. *Hymenopt.*

Pl. 14, 8 & 10. *Chauliodes serricornis*. 9. *Polystoechotes sticticus*.

Pl. 15, 7. *Chauliodes pectinicornis*. 8 & 9. *Diptera*.

Pl. 20, 14. Longicorn beetle.

The much later work of Catesby figures only 17 insects from North America.

NOTES ON APHIDIDÆ.

BY JOSEPH MONELL, E. M., ST. LOUIS, MO.

APHIS LONICERÆ Monell. Riley & Monell, Notes on the Aphididæ, U. S. Geol. and Geogr. Survey, Vol. v., Jan., 1879, p. 6.

This species is the one mentioned by Prof. Thomas in the eighth Ill. Ent. Rept., p. 104, under the name of *Chaitophorus loniceræ* Mon'l Mss.

PHORODON MAHALEK Fonsc. This European species has been very abundant at the Missouri Botanical Gardens, St. Louis. I believe that it has not before been definitely reported as occurring in the United States.

CHAITOPHORUS SMITHIÆ Monell, l. c. p. 32.

Chaitophorus salicicola Thos. l. c.

CALLIPTERUS Koch.

Continued study of this genus has confirmed me in the opinion that the subdivision proposed by Passerini is impracticable. In this I am confirmed by Prof. Buckton in his valuable work on the British Aphides.

C. ULMIFOLII Monell, l. c. p. 29.

C. ulmicola Thos. l. c. p. 111.

C. (MYZOCALLIS) HYPERICI Thos.

This species was previously described by me as *APHIS HYPERICI* l. c.

p. 25. This insect is a typical Aphis and lives in clusters. So far as I know, all Callipterus are sporadic in habit.

C. TRIFOLI n. sp.

Apterous individuals : Tuberculate ; with capitate hairs.

Winged individuals : Dorsum without conspicuous tubercles. Third joint of antennæ twice as long as the fourth ; fourth and fifth joints sub-equal ; sixth and seventh joints sub-equal.

Wings : Marginal cell hyaline. Veins bordered with brown. Basal half of stigmal vein sub-obsolete and not thickened and dusky at base.

Length of body .04-.05, of wing .07, of antennæ .06 in. Clover leaves. June.

This species can be easily distinguished by the naked eye from *C. punctata*, by having the veins more robust, and shaded not only at tip but for their entire length.

The American species may be distinguished as follows. With regard to the species described by Fitch, see Riley & Monell, l. c. p. 28.

A. Dorsum of winged individuals with spine-like tubercles... *C. ulmifolii*

AA. Dorsum without spine-like tubercles.

a. Marginal cell dusky.

b. Middle tibiæ pale yellow. Femora pale yellow..... *C. Walshii*

bb. Tibiæ black. Apical portion of femora black..... *C. bella*

aa. Marginal cell hyaline.

b. Wings with transverse, shaded bands.

c. Abdomen with conspicuous dusky spots..... *C. discolor*

cc. Abdomen yellow, concolorous, or with very faint transverse bands... *C. asclepiadis*

bb. Wings sub-hyaline.

c. Nectaries distinct.

d. Wings not hyaline.

e. Sixth joint of antennæ half as long as seventh... *C. punctata*

ce. Sixth and seventh joints sub-equal..... *C. trifolii*

dd. Wings hyaline.

e. Apical joint of antennæ a little longer than the sixth, veins whitish... *C. hyalinus*

ce. Apical joint of antennæ three times as long as the sixth.

First and second discoidals black... *C. betulaecolens*

cc. Nectaries not perceptible.

- d.* Wings hyaline.....*C. caryae*
dd. Veins bordered with brown.....*C. quercicola*

COLOPHA COMPRESSA (Koch.)

Schizoneura compressa Koch. Pflzl. 1854.

Byrsocrypta ulmicola Fitch. Fourth N. Y. Rep't, 1858 §. 347.

Thelaxes ulmicola Walsh. Gen. Am. Aph. Proc. Phil. Ent. Soc.
 1, 1862, p. 305.

American Entomologist, I, 1869, p. 224.

Colopha ulmicola Monell. C. E. ix, 1877, p. 102.

Glyphina ulmicola Thomas l. c. p. 142, 1879

Colopha compressa Lichtenstein. Les pucerons des ormeaux.
 Feuille des Jeunes Naturalistes, 1880.

American Entomologist, iii., p. 76, 1880.

This insect has been referred to six different genera. The synonymy of this species up to 1877 has been discussed in the C. E., ix., 102.

The genus *Glyphina* was insufficiently characterized by Koch. The species upon which it was founded, *G. Betulae*, is referred to the genus *Vacuna* by Passerini (1863), Walker (1870) and Kaltenbach (1874) under the name of *V. alni* Schrank.

Some doubts existed as to whether intermediate forms would not be found connecting *Vacuna* and *Colopha*, as it has been found that the number of joints in the antennæ sometimes vary (see Lichtenstein, Entom. Monthly Mag., March, 1880), but Prof. Riley, who has investigated this subject with his usual ability, has succeeded from biological evidence in establishing the right of *Colopha* to rank as a separate genus.

According to Mr. Lichtenstein, of Montpellier, the true female of *Vacuna* has a rostrum and lives about a month sucking at the leaves. In *Colopha*, on the other hand, the true female has a rudimentary mouth and dies with the egg in the body. Judging by analogy with *Tetraneura*, it is probable that the true female lives but for a few days. The validity of the genus *Colopha* is acknowledged by Lichtenstein, Kessler, Loew and Fr. Thomas, but all of these gentlemen concur in considering the European *S. compressa* Koch identical with the American *B. ulmicola* Fitch.

TETRANEURA Hartig.

Byrsocrypta Hal (in part), nec Walsh.

Antennæ short, six-jointed.

Wings deflexed. Fore wings with four simple oblique veins. Hind wings with one oblique vein.

This genus has not been previously found in America. The only species known are *T. ulmi* Geoffr., *T. alba* Ratzb. and *T. rubra* Licht.

I have succeeded in raising *T. ulmi* at St. Louis from eggs sent to me by Mr. Kessler, of Cassel. They seemed to thrive the first season, but did not appear again the next year.

T. GRAMINIS n. sp.

Head and thorax dusky, abdomen dusky or sometimes of a greenish or yellowish tinge. Antennæ dusky, the third joint as long as the three following taken together; joints four and five equal; apical joint a little over half as long as the preceding. Wings hyaline. Subcostal of the hind wing comparatively straight.

Length of body .08, to tip of wings .12 in.

On leaves of *Aira caespitosa* and *Agrostis plumosa*, enveloped in a thick cotton-like secretion.

Sept.—Oct. St. Louis, Mo. Springfield, Mo. Neosho City, Mo.

PEMPHIGUS ACERIS n. sp.

Winged female: Head and thorax dusky, abdomen dusky, but appearing white from the abundant pulverulent matter. Antennæ long, slender; the apex of the fourth joint reaching the wing insertions; joints sub-cylindric, scarcely contracted at base, apical unguis not perceptible; fourth and fifth joints sub-equal, fourth joint not clavate, third joint less than the two preceding taken together.

Wings sub-hyaline, subcostal and oblique veins brownish black. Stigmal vein arising behind the middle of the stigma. Venation closely resembling that of *P. acerifolii*, except that the base of the first discoidal is usually more remote from that of the second discoidal. Length 0.12—0.15, to tip of wings 0.20—0.22 in. On the under side of limbs of Hard Maple, enveloped in woolly matter. Peoria, Ill. June (Miss E. A. Smith). A comparison of about fifty species, each, of *P. aceris* and *P. acerifolii*, shows that the antennal differences between the two are quite constant.

ENTOMOLOGICAL NOTES FOR THE SUMMER OF 1881.

BY PROF. E. W. CLAYPOLE, YELLOW SPRINGS, O.

I came only last year on the premises where I am now residing, and though I had a small crop of cherries, they were so badly infested with the weevil (*Conotrachelus nenuphar*) that only a few quarts could be found free from the grub and fit for canning. This year a fair crop was promised, the spring was late and the danger of frost little. I proposed therefore to make war upon the enemy, and as soon as the blossom was over prepared a large sheet of cheese-cloth, and for about three weeks jarred the trees before breakfast almost every morning. As the result, I have now nearly 2,000 weevils peacefully reposing in a bottle, after a composing draught of benzine. Only about 10 per cent. of my cherries this year were unfit for use. I carried the war into the orchard, and simply by way of experiment, jarred some of the early apple trees and captured a great many of my enemies. I am more than repaid for my labors both on the cherry and apple trees by the quality of the apples, when last year, with a larger crop, I only obtained knotty, gnarly fruit. I have this year round, smooth, well-shaped apples. I have never heard that anything has been done, at least in this neighborhood, to trap the weevils on the apple trees. Those who live in the north have no idea of the mischief wrought here by the weevil in the orchards.

A word for the mole. In digging potatoes this year I observed the runs of a mole in all directions through the ground. It was a piece of old sod and very much infested with white worms, the larvæ of the Cockchafer (*Lachnosterna fusca*). Many of the potatoes had been partly eaten by these worms, but I observed that wherever a mole-run traversed a hill of potatoes no white worm could be found, even though the half-eaten potatoes were proof of his former presence. The inference is fair that the mole had found him first and eaten him, and very likely the mole's object in so thickly tunnelling this piece of ground was to find these grubs.

Now it would be very easy to trump up a charge against the mole on the evidence of these facts. There was the "run" which nothing but a mole could make, and there were the gnawed potatoes; put the two together and kill the mole. Many a man has been punished on less conclusive circumstantial evidence. But it is perfectly easy to distinguish the work of a mole from that of a white worm, if one will only take the pains.

I have many times found the latter coiled up in the potato he was eating, but I have never seen the mark of teeth such as the mole possesses on a potato. Nor do I believe the mole ever meddles with potatoes, or corn.

Abundance of Certain Insects.—The Southern Cabbage Butterfly (*P. protodice*) is exceedingly abundant here this summer. I have been able to count scores on the wing at one time.

The potato worm, or larva of *S. 5-maculata*, is troublesome on the late potatoes this month (September) and soon strips a plant of its leaves. However, he is easily dealt with, as he is at once betrayed by the castings on the ground, and a little "poison-dust," such as I use for the beetle, soon makes an end of him. I have tried "Buhach" on this insect, but find the former much easier of application and more effective. The latter diluted with ten parts of flour had little effect on the worms, but when used neat it stopped their feeding and killed two of them in a couple of days. But there is the trouble of looking up the creature (green on a green ground) in order to put the powder "where it will do the most good," whereas one need only shake the powder-tin over the plant and pass on, leaving the worm to poison itself.

The same is true of the Cabbage Butterfly (*P. rapæ*) in the early stages of growth of the cabbage. I have used Buhach, and a friend of mine is now using it on a plot of 3,000 heads of cabbage, but the time spent in finding the green worm on the green leaf is a serious drawback, and while the plant is very young I prefer using the "poison dust." I can sprinkle a whole bed while I am finding the worm on a dozen cabbage heads in order "to put salt on his tail." The "poison dust" to which I refer is made by mixing one part of London Purple and sixty parts of ashes and passing the mixture several times through a fine sieve. I may add that I find this a very efficient remedy for the turnip fly.

NEW MOTHS, CHIEFLY FROM ARIZONA.

BY A. R. GROTE.

(Continued from Vol. xiii., p. 229.)

HADENA IDONEA, n. s.

♂ ♀. This species is similar in size to *verbascoides* and *cariosa*; it is very like the latter only instead of reddish brown the color is of an ochrey brown, rather pale, the stigmata concolorous, rather wide, ill-

defined, separated by the dark median shade. The claviform spot is open, and stretches across the median field nearly touching the even t. p. line. Lines geminate, marked on costa. A slight, irregular basal streak and one below it on internal margin. Terminal field dark shaded, obtaining twice, opposite cell and at internal angle. Fringes dark cut with pale. Hind wings very dark, with paler fringes, concolorous, an indication of discal mark; beneath with faint double extra-mesial lines; the narrow terminal space paler on both wings. The costa of fore wings is more or less pale. Abdomen tufted. This species is more ochrey than *vulgaris*. Texas, Kansas, Wisconsin.

HADENA AUREA, Grote.

This species may be known from all the other forms of *Pseudanarta* by the white discal (reniform) spot and the orange hind wings. A specimen from Arizona is a little larger than my type and the fore wings show indications of the t. p. and s. t. lines shaded with whitish and give the outer third of the wing a little the appearance of *flava*. The white discal spot of fore wings is repeated beneath and is probably a quick character of the species. The hind wings are bright orange above and below, without discal mark and with a moderate, even, black marginal band. My type from Texas has the fore wings a little rubbed. The Arizona specimen expands 21 mil. Coll. B. Neumoegen.

ONCOCNEMIS GRISEICOLLIS, n. s.

Allied to *atricollaris* but smaller, the collar entirely whitish gray, head blackish. Eyes naked; the short fore tibiae with a terminal claw. Gray, of a whitish tone. Under the glass the surface of primaries is whitish sparsely mixed with black scales. The markings hardly visible to naked eye. Under the glass the black, perpendicular, thread-like t. a. line is seen and attached to it a sub-rounded enclosed concolorous spot, the claviform. Similarly the concolorous orbicular and reniform may be seen ringed with fine black circles, the stigmata subequal, orbicular round, reniform upright, hour-glass shaped. Median space narrow; t. p. line indicated. A black dash from the reniform outward tapering to external margin. Similar fine interspaceal shades give the terminal space a slightly rayed appearance. Hind wings whitish, sub-pellucid. Beneath pale. *Expanse* 25 mil. Arizona, coll. B. Neumoegen.

This makes the twenty-first species of this genus discovered in North America. The species is interesting as affording an ally to *atricollaris*.

PYGARTIA ABDOMINALIS.

This species described by me many years ago, from a specimen taken by me in Alabama, is, I now believe, wrongly placed. The type has been broken; only a pair of wings remain. I believe it to be a *Euchaetes*, not since taken. The fore wings are of the same dark color as *egle* and *Spraguei*, but there is a distinct dark yellow costal vitta. The species will easily be recognised from the description, with its reference to *Euchaetes*. The median vein of secondaries is 4-branched, 3, 4, 5 being thrown off near together from the extremity of the vein. The type was a female, as may yet be verified by the divided frenulum.

CAPIS CURVATA, n g. et sp.

A Deltoid form with the outline of *Lisyrhyphen*a, but the wings broader and shorter. Antennæ simple. Ocelli. Labial palpi moderately projected, third article short, a little depending. Fore wings broad, glistening deep brown, with a curved even s. t. line, outside of which the exterior margin is washed with white. Hind wings concolorous fuscous. Beneath paler fuscous, without markings. This species I have seen in Prof. Lintner's collection. One specimen in my own expands 20 mil. New York.

SOME PECULIARITIES OF ARGYNNIS IDALIA.

The males are very plentiful throughout the summer, flying about feeding on the flowers of the clover and milk-weed; but the females are exceedingly rare, and I never saw one feeding but once. I collected a whole summer and did not succeed in finding one. I never have seen the female on the wing, unless I had scared it from its hiding place. Of course the females must feed, but I cannot imagine when they do so. In trying to discover where the females were, I found that they remained hidden in the long grass of the fields near the ground, and they would not take wing unless you nearly stepped on them, when they would get up as quickly as a partridge. Their flight is exceedingly rapid and generally in a straight line for about 100 ft., and then they do not alight on a flower or bush or flutter about like the male, but suddenly drop like lead in the long grass. It would be almost impossible to tell the exact spot where they alight, as they drop so suddenly, but on approach near it they are off like a shot again. I was thus able to distinguish the males from the females by the peculiarities in their flight alone.

HARRY SKINNER, Philadelphia, Penn.

The Canadian Entomologist.

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No. 2

NOTES ON CERTAIN BUTTERFLIES, THEIR HABITS, ETC.

No. 1.

BY W. H. EDWARDS, COALBURGH, W. VA.

1. PAPILIO PHILENOR.

On 21st May, 1881, I saw a female *Philenor* fluttering about a low plant in the edge of the woods near my house. Apparently it was a vine just out of the ground—some four or five inches high—and three eggs were laid on the stem. I sent the plant to Mr. Scudder for determination at the Botanical Gardens, but he reported that there was not enough of it for that purpose.

On 1st Aug., I saw a female coursing over the hill side, alighting on various species of plants for an instant; sometimes on clover heads or other flowers, then flying again in short circuits, touching a leaf here and there. Perhaps it was ten minutes before she lingered on one plant longer than usual, though then but for three or four seconds, and I found on examination three eggs laid on the stem just below the terminal leaf. The plant was of the same species I had noticed in May, and I dug it up and planted it in the garden. When at Cincinnati, at the meeting of the A. A. A. S., I learned from Dr. H. S. Jewett that this must be *Aristolochia serpentaria*, a common plant about Dayton, O., and later I received from him several dried examples of it. I had no idea that this was what is spoken of by Dr. Boisduval, Lep. Am., as the food plant of *Philenor*, as it is wholly unlike other species of *Aristolochia* with which I am familiar, they being all vines, and this a low herb. Gray describes it as growing in rich woods, Conn. to Ind., and southward, the stems 8 to 15 inches high, leaves ovate or oblong from a heart-shaped base. The Virginia Snake-root of medicine.

2. PAPILIO MACHAON.

During the winter 1880-81 Mr. Mead sent me a large number of chrysalids of *Machaon*, imported by him from Germany, requesting me to turn

the butterflies loose here as they emerged. The first one was female, out 6th May, when the lilacs were in blossom, and I placed it on the flowers. Others emerged day by day. On 9th, I recorded that I had turned out 40 to 50, but they soon disappeared and were not again seen. I saw one soon after I had placed it on the lilac, pursued by an *Ajax* as if it was regarded as an intruder. In all upwards of 100 were freed. About a week after the last butterfly had emerged, I caught a male near the house on a clover head, and this was the only *Machaon* I saw during the summer. I had planted a large quantity of Fennel, thinking the females might deposit eggs thereon, but diligent search failed to discover any.

3. Effect of Cold Applied to Larvæ.

1. DIANA. In 1873-4, I succeeded in rearing one of these larvæ from the egg to imago, starting with several hundred eggs; there were losses at every stage. The duration of each stage was also very great, of 2nd stage 16 days; of 3rd, 14; of 4th, 17; of 5th, 12 to 5th moult; from 5th moult to pupation 22 days; of the chrysalis 21; the butterfly emerging 9th June.

In Sept., 1880, I obtained about 100 eggs, and as soon as the larvæ hatched, I sent most of them to Prof. Fernald, at Orono, Me., to go in an ice house. A few I kept myself and tried to carry them through the winter in a cold room, but by 11th Feb'y, 1881, all had died. Most of those sent to Orono also died from the ice giving out late in the fall apparently, but in one little paper box were a few larvae (10 or 12) still alive when I received it, 7th March. From these I raised 4 butterflies, and could have several more, had I not put one at each larval stage, and one chrysalis, in alcohol. The stages were in duration as follows, beginning at 1st moult, or the next one after hibernation:

No. 1. 2nd stage, 10 days.	No. 2. 2nd stage, 13 days.
3rd " 9 "	3rd " 9 "
4th " 7 "	4th " 5 to 6 "
5th " 6 "	5th " 5 "
5th moult to pupation 13 days.	5th moult to pupation 13 days.
In chrysalis 19 days (♂).	In chrysalis 19 days (♂).
No. 3. 2nd stage, 13 days.	No. 4. 2nd stage, 14 days.
3rd " 9 "	3rd " 9 "
4th " 5 to 6 "	4th " 5 "
5th " 5 "	5th " 6 to 7 "

5th to pupation 14 days.

In chrysalis 21 days (♀).

No. 1 was 64 days from 1st moult to imago.

No. 2 was 65 " "

No. 3 was 67 " "

No. 4 was 65 " "

5th to pupation 10 to 11 days.

In chrysalis 19 days (♂).

Whereas the period of the larva before spoken of (1873-4) was 102 days from 1st moult to imago. The frozen larvae were healthy at all stages, and I lost none after 1st moult, except one in chrysalis.

2. CYBELE.

In Sept., '79, I obtained eggs of *Cybele*, and 7th Oct., I sent 40 larvae just hatched to Prof. Fernald, to go on ice. Others I retained, and tried in the usual way to carry them through the winter, but in Feb'y I found that these were dead. I received the lot from Orono 3rd March, '80. These were nearly 5 months in the sawdust next the ice in house, as Prof. Fernald wrote me. Two days after they reached me several were moving about, and I transferred them from the boxes to violet. The stages were :

No. 1. 2nd stage, 12 days.

3rd " 4 "

4th " 5 "

5th " 7 "

No. 2. 2nd stage, 10 days.

3rd " 6 "

4th " 7 "

5th " 4 "

5th moult to pupation 9 days.

In chrysalis 16 days.

From 1st moult to imago 62 dys.

No. 3. 2nd stage, 8 days.

3rd " 9 "

4th " 8 "

5th " 8 "

5th moult to pupation 12 "

In chrysalis 20 "

1st moult to imago 65 "

The first butterfly emerged 12th May (♂).

Here again, as in the case of *Diana*, above related, the periods were all shortened by the freezing the larvae had undergone, and the larvae were healthier at every stage. In 1874, out of 100 caterpillars of *Cybele* hatched in fall of '73, I obtained but 3 chrysalids, and from these 2 butterflies. From 1st moult to butterfly was 104 days.

In 1874-75, I raised three butterflies, *Cybele*, starting with 219 eggs by count, obtained from one female, 5-7 Sept. The 1st moult occurred (in greenhouse) 13th Feb'y, 1st chrysalis was reached 29th April, and the butterfly emerged 24th May, the period from 1st moult being 100 days. I found the same result in freezing caterpillars from eggs laid by *Satyrus Nephela*, as I related in Can. Ent., vol. xii. It may be assumed that freezing through the winter preserves the lives and contributes to the good health of caterpillars which go into lethargy from the egg, all the way to the imago.

4. On Transportation of Eggs and Young Larvae.

I have frequently had eggs of butterflies sent me from points 5 to 12 days distance by mail, and except in rare instances, the larvae hatched *en route* have died in consequence of the decay of the leaves (food) sent with them. Some leaves, being of a dry nature, like *Celtis*, bear a 6 to 10 days journey from South Florida very well, and usually some larvae reach me alive. Willow does not bear this journey readily, and I have lost several lots of larvae of *Limenitis Eros* in consequence, though in two or three cases they have reached me alive. But Passion-vine has always decayed, even in 5 days. The leaves break loose from the stem and get rolled into a nasty rotten ball, destroying everything in the box. So I have several times lost larvae of *H. Charitonia*. I suggested to Dr. Wittfeld, who sent these, to tie each leaf of Passion-vine to the stem before boxing, to prevent their breaking off, and this has seemed to work better.

On 30th Aug. last, I made an experiment, putting a stem with half a dozen leaves of Passion-vine into an eight-oz. bottle and corking tight. This was placed in a dark closet. Temperature without was high, among the nineties daily. After ten days, I first discovered signs of mould and decay in the leaves, and then only in the tender terminal ones.

At same time I had bottled in similar manner two leaves of Pawpaw, on each of which an egg of *P. Ajax* had been laid that morning. At that season the eggs of *Ajax* would hatch in 4 to 5 days. On the 9th day, I observed the first signs of mould, and that on one leaf only. The other was sound, and two caterpillars were upon it, and both had just cast their skins at 2nd moult, the skins being still present. They had hatched about 5 days before, and though corked up and kept in the dark, were apparently as healthy as though all the conditions had been normal.

I then requested Dr. Wittfeld to bottle leaves of Passion-vine and mail to me packed in a box, which he did. This was in October, and the package was 10 days on the road. Two leaves were rotten and worthless for food, but still held together, and four leaves were sound.

Therefore, it is plain that in corked bottles, or in air tight tins, eggs of butterflies can be forwarded from points 8 to 12 days distant, i. e., Florida, Texas, Arizona, California, Oregon, and the larvae from them will probably reach their destination in good condition.

I received several tin boxes (soda-powder boxes, and not air tight) from Arizona the past season, from Mr. Doll. Three contained eggs of two species of *Lemonias*, viz., *Palmeri* and *Nais*. They were sent on the leaves and stems of Mesquit, on which they had been deposited, and between layers of cotton wadding. As it happened, the eggs, though out 12 days, were but partly hatched when I got them, and the hatching proceeded. Had they hatched two or three days earlier, I should have lost every caterpillar, for the leaves were dry as tinder and unfit for food. I believe, as the result of several observations, that it is not well to place the leaves in cotton in any case, as this seems to extract the moisture from them. Even in so short a journey as from Coalburgh to Philadelphia, 26 to 30 hours, Mrs. Peart has noticed that whenever cotton was in the box with leaves, the latter had suffered.

Eggs should in no case be sent in wood or in paper boxes, as the leaves dry up at once, and any larvæ will starve. I am very anxious to receive eggs of any species of butterfly, especially of all Satyrids in Rocky Mts. to Pacific, including species of *Chionobas*; of all Argynnid and Parnassians; and if any collectors will send me these, or one or more of them, corked in glass, or in air tight tin, I will pay liberally for them, or exchange butterflies for them to any extent. I would gladly give twenty species of butterflies for one lot of eggs which I have hitherto not had.

5 On Irregularity of Number of Moults in Larva of *APATURA FLORA*.

In *Psyche*, vol. 3, p. 159, I enumerated the species of butterflies whose larvæ I had bred from the egg, and gave the number of moults of each. One or two had but three, nearly all had four, and some had five. When the species is two-brooded, and the larvæ of one brood hibernate, they usually pass five moults, but in the summer brood of the same species

there are four.* In the case of *Apatura Celtis*, at Coalburgh, the species being two-brooded, there are five moults in the winter brood, four in the summer. In *A. Clyton*, which here has but one annual brood, there are five moults, the larvæ hibernating. In *A. Flora*, belonging to same subgroup with *Clyton*, as distinguished from *Celtis*, but a Florida species and double-brooded, I cannot speak as to the number of winter broods, but in the summer of 1880, I found four moults only. I received eggs from Indian River in July, and raised nine larvae to imago. But in 1881, I raised larvae in August, from eggs received from Indian River, and all passed five moults. Mrs. Peart, who was feeding two of this lot of larvae, and making drawings of each stage, wrote me 25th Aug. that both had passed 5th moult, and I had discovered the same thing myself.

In 1880, 1st moult, 24th July.

In 1881, 1st moult, 3rd Aug.

2nd "	28th "	4 days.	2nd "	7-8th "	4½ dys.
3rd "	1st Aug.	3 "	3rd "	12th "	3½ "
4th "	5-6th "	4½ "	4th "	18th "	6 "
Suspended	14th "	7½ "	5th "	24-25th "	6½ "
			Suspended	1st Sept.	7½ "

In 1880, from 3rd moult to suspension was 13 days; in 1881 was 20 days; and the length of this last period would seem to make an additional moult necessary, but why the stages were so protracted in '81 and so short in '80, I cannot guess. The conditions were similar so far as I know. In '80, I had 4 males, 6 females from chrysalis, in '81 both sexes, though I do not appear to have made a note of the exact number of each. But as all the larvae in one year passed 4 moults, and all in the other 5, the difference was not sexual.

6. The proportion of chrysalids of *PAPILIO AJAX* which go into premature hibernation does not always increase as the season advances.

Mr. Scudder states this as a rule, in "Butterflies," p. 172. In 1872, I related my observations on *Ajax*, and I say: "It will be noticed that a large percentage of the chrysalids of nearly every brood pass the winter, the proportion *seeming to increase as the broods succeed each other.*" Now

* I omitted to state in that paper, that *Limenitis Disippus* makes its case in the fall either after second or third moult. Of 7 larvæ in Oct., 1881, 5 went into their cases after second moult, 2 after third. I have noticed the same thing in former years, but no larva has passed more than two moults after hibernation. So that this species would have both 4 and 5 moults in the winter generation.

this rule is not absolute. In 1881, from eggs laid by the form *Telamonides*, I had 26 chrysalids, the last of which formed 19th June. From these, 4 butterflies only emerged the same season, and the rest of the chrysalids are now passing the winter. If the rule above set forth held, the proportions should have been reversed, or 22 butterflies should have emerged and 4 chrysalids passed the winter.

7. AJAX, WALSHII and TELAMONIDES.

Mr. Raphael Meldola, in Ann. and Mag. Nat. Hist., xii, 1873, made some remarks on my history of *Ajax*, But. N. A., v, 1, to which Mr. Scudder called attention in Proc. Bost. Soc. Nat. Hist., vol. xvi, 1874, and this last paper closed with these words: "Mr. Edwards had not drawn attention to the fact that *Walshii* and *Telamonides* belonged to the same brood; the former consists of earlier, the latter of later individuals from wintering chrysalids; the second brood of the species (the first from short-lived chrysalids) is *Marcellus*, and made up of the mingled progeny of both *Walshii* and *Telamonides*."

In the "Butterflies," p. 170, Mr. Scudder again refers to this: "The first two (*Walshii* and *Telamonides*) do not appear to represent distinct broods; and this point, to which Mr. Edwards strangely failed to draw attention in the first account of his observations, is one of the most extraordinary features in the history of the insect; for *Telamonides* is not the direct con-seasonal produce of *Walshii*, but both are made up of butterflies which have wintered as chrysalids, those which disclose their inmates earliest producing *Walshii*, the others *Telamonides*; while all butterflies produced from eggs of the same season, and there are several successive broods, belong to *Marcellus*."

The experiments recited in But. N. A. ran through two seasons, 1870, 1871. In the former they began with *Telamonides*, circumstances making it impossible for me to begin with *Walshii*, the earlier form. During the following winter nearly all the hibernating chrysalids were destroyed by a fire which burned my house. But the experiments and observations enabled me to say in the text, "that from *Telamonides* came *Marcellus* the same season, and *Telamonides* in the following spring; that from *Marcellus* came successive broods of *Marcellus* the same season and from the last brood *Telamonides* in the spring." Also, "these observations failed to determine the connection between *Walshii* and the other two forms," and I therefore set myself at work to ascertain what that might be, by breeding

from *Walshii* as well as the other forms, and continued the experiments the season through. Now, in Jan., 1872. Part ix of the But. N. A., which contained *Ajax*, issued, before the chrysalids which hibernated had given imagos. But I had discovered enough during the two seasons, and by outside observations, to enable me to say: "The summing up therefore of this whole series of observations is this: *Walshii* produces *Walshii*, *Telamonides* and *Marcellus* the same season; *Telamonides* produces *Marcellus* the same season and its own type in the spring; *Marcellus* produces successive broods of *Marcellus* the same season, and occasionally *Telamonides*, and the last brood produces *Walshii* and *Telamonides* in the spring; and whenever any of the chrysalids of either brood of *Marcellus* pass the winter they produce the other two varieties (forms), and probably sometimes their own type (individual, i. e., *Marcellus*, taken April, 1867). The chrysalids of *Walshii* that pass the winter of 1871-2 will probably produce *Walshii* or *Telamonides*."

It seems to me that this statement is explicit as to *Walshii* and *Telamonides* together being the product of one or any lot of eggs laid by *Marcellus* ♀ the previous year. As to what the chrysalids of *Walshii* or *Telamonides* might actually produce I could not then state with certainty, for the reason given. Since that first account I have spoken of these forms and their relationships in several papers, and it was hardly necessary for the author of the "Butterflies," ten years later, to call attention to a strange omission in my first account, even had there been such an omission, when subsequent observations described by me made the whole history clear. It certainly was not strange that I did not state as fact more than I then knew. At all events, what I have not discovered about *Ajax* no one has discovered, for my observations to this day are the only ones on record.

NOTE ON CHIONOBAS VARUNA.

BY W. H. EDWARDS.

After the description of this species in the Jan. No. was in type, I received a letter from Mr. A. G. Butler, to whom I had sent an example, with request to be informed if it was *Tarpeia*, spoken of in his Catalogue of Satyridæ as being N. American. Mr. Butler writes: "Your Chionobas

is very distinct from *C. Tarpeia*; the latter comes nearer to *C. Chryxus*, being quite a fulvous species, with blind ocelli on under surface. The band of secondaries also is altogether different in outline"; and Mr. Butler gives me a drawing of the wing and band. His drawing and description in all points named agree with what Mr. Scudder formerly described as *C. Calais*, from a single female taken by Mr. Drexler 20 years ago, at Rupert House, Hudson's Bay, and on carefully comparing this (which remains unique in my collection) with a series of *C. Chryxus* from the Rocky Mts., I see that it is a distinct species, and not *Chryxus*, as of late I had assumed.

NOTE ON LIMENITIS URSULA.

BY W. H. EDWARDS.

In my paper on *L. Arthemis* and its alleged second brood, in Dec., 1881, I stated that some caterpillars of *L. Ursula* did go on to chrysalis and butterfly late in the year, in Ohio, though others of same lot went into their hibernacula when half grown; and that I had dissected one female *Ursula* which emerged in September last, and could discover no signs of eggs, or at any rate, there were no formed eggs. Also that I had sent a second female of same lot to Prof. Minot for examination. I now have his report, as follows: "There were certainly no ripe eggs in the abdomen, although there were a great many eggs in an immature condition." I stated in the above mentioned paper, that the existence of the species *Ursula* did not depend on these late, or September butterflies; and the reason is, that the female coming so late, and with immature eggs, the season would either not allow the eggs to ripen, or if it did, and they were impregnated, which would be doubtful, it would not allow the larvæ to hatch and to reach the hibernating stage. There is not time for all this before frosts or cold weather. Of course, the same would hold good of *Arthemis*, if possibly any females of a second brood should emerge.

ON TWO GENERA OF PHYCIDÆ.

BY A. R. GROTE.

I find that unless we use neurational characters to separate the genera of *Phycide*, that it will be impossible to classify the species with accuracy. All characters drawn from the periphery, the appendages of the body, will

be found subject to very gradual modifications, but I do not think we can afford to reject any of them, because of their relative want of stability. Indeed the neururation in the Lepidoptera seems to be as useful as in the Diptera, although there are certain cases (as I long ago pointed out with regard to *Thyridopteryx*) where it varies not only in the species, but in the opposite wings of the same specimen. I think that we must regard as generically distinct from *Pempelia* the North American species *Pravella*, which has 8, instead of 7 veins to the hind wings (see Bull. U. S. Geol. Surv. 4, 694). For this species, the structure of which I have quite fully described, I propose the generic name *Meroptera*. I also find that our two species, found in Texas and Colorado, and which probably mine the Agave, viz., *Bollii* and *Dentata*, are distinct from the European types of *Zophodia*, to which Prof. Zeller referred *Bollii*, the type of the new genus *Megaphycis*. In the structure of the palpi, shape of the wings, greater size and length of body, our two large species differ strongly.

I have also here to correct a mistake of mine in the use of the term "porrect" in this group as applied to the labial palpi (e. g. in *Pinipestis*). I meant by it *ascending*, whereas it appears that it is equivalent to *extended forwards*. The term appears inconvenient to use, and perhaps I am not alone in mistaking its sense.

A NEW APPLE TREE PEST.

BY CHARLES R. DODGE, WASHINGTON, D. C.

As if the apple tree with its sixty or more insect enemies were not sufficiently afflicted, a distant relative of the Canker-worm has been making itself so notorious in Georgia, as to give apprehension of the total destruction of apple orchards in the locality infested. The insect complained of is *Eugonia subsignaria* Pack., a measuring worm which at times has been a veritable nuisance upon shade trees in New York and Philadelphia.

In pursuance of my duties as a Special Agent of the Census Office (in the fruit interest), and through subsequent correspondence, the following facts were obtained from Mr. Adam Davenport, of Fannin County, in the State named. In his first communication, received some months since, it is stated that the worm made its appearance upon Rich Mountain, a spur of the Blue Ridge, about four years ago, attacking forest and fruit trees ;

and that it had since spread over a large area, doing great damage. Apple trees in June last were as destitute of leaves as in mid-winter, the fruit growing to the size of marbles and falling off.

A late communication—with replies to a series of questions—shows the destruction to be even worse than at first reported. I give Mr. Davenport's own words :

"The insect made its appearance four years ago upon Rich Mountain, since which time it has been spreading in a northern semicircle at the rate of about fifteen miles a year. It is by far the most interesting insect that has plagued this country since the first white settlement. So wonderfully prolific, that in two years it literally covered every tree, bush and shrub, and with the exception of a few varieties, stripped them of their leaves.

"The egg hatches about the first of May, and the caterpillar, which is dark brown, lives about forty days, transforms to a chrysalis, lives in this state about ten days, and emerges a milk-white miller. For two weeks before their first transformation the fall of their excreta, in the woods, resembles a gentle shower of rain, and from its abundance tinges the streams a dark green hue. I have seen trees that had been stripped of their foliage, entirely wrapped up in their silken webs, resembling, when covered with dew, a wrapping of canvas. They constitute a great feast for all insectivorous birds and animals ; it is said that even cattle and sheep eat them with great greed. They have an instinctive way of protecting themselves by losing their hold upon the limb, at the slightest touch, and swinging by their web in the air. For this reason they are easily shaken off into sheets and destroyed ; however, they are so numerous, this remedy is worth nothing except in keeping them off very small trees. This instinct is not lost after leaving the caterpillar state, for if a bird alights upon a tree above the millers, they suddenly drop like a shower of snow to the ground for protection."

In the Practical Entomologist, volume 1, page 57, an anonymous writer gives an account of this insect's attacks on elms in Philadelphia. Dr. Packard, in his Monograph of the Geometrid Moths, page 528, mentions only elm as a food plant, but Prof. Thomas, in his Second Illinois Report, page 243, says : "I have not noticed them feeding upon that tree, but have twice found them feeding upon apple, upon the leaves of which I have reared them to the perfect insect. In neither case were they numerous." Prof. Comstock makes brief mention of the insect in his

recent report as United States Entomologist, quoting Mr. Davenport, as above, to the effect that the worms were destroying forests of hickory and chestnut, and were damaging fruit trees. This statement doubtless refers to the season of 1880.

The infested district in Georgia is not less than 60 miles long by 40 wide, and embraces Union County on the east, Gilmer on the west, and Polk County, Tennessee, on the north. They have been injurious two years, but in the summer of 1881 they were most destructive.

It is stated in the Practical Entomologist that the eggs are deposited in masses of fifty upon the limbs of the tree. A piece of apple bark before me presents an irregular patch over three inches long, and $\frac{1}{4}$ to $\frac{1}{2}$ inch broad, the eggs closely crowding upon each other. As there are many hundreds, they have doubtless been deposited by a number of moths, which attests the truth of Mr. Davenport's statement regarding their falling in showers like snow.

They are deposited for the most part on the under side of the limbs on the tops of the trees, and not only upon the bark, but the tufts of moss are covered by clusters of them. The eggs are smooth, dull, irregularly ovoid, slightly flattened upon the sides, rounded at the bottom, while the top is depressed, with a whitish rim or edge, forming a perfect oval ring. Color yellowish brown, resembling brown glue. Length of examples before me, .04 inch; width, lying upon the flattened side, .03 inch; thickness, or smallest diameter, .02 inch. They are deposited in curved or straight rows of a dozen or more (or less), these lines forming masses often of many hundreds.

The name, *Eugonia subsignaria*, is given on the authority of Mr. Davenport, supported by his descriptions in answer to my questions, as I have had no means of determining the species. There is no doubt in my mind, however, of the insect's identity.

NOTE ON THE GENUS TRIPUDIA AND ON THE SPECIES OF SPRAGUEIA.

BY A. R. GROTE.

On pages 231 to 238 of the CANADIAN ENTOMOLOGIST for 1879, I gave a list of the species of *Spragueia* and allied genera. I am still in doubt of the position of *Apicella*, from want of material to examine. It may belong to *Fruva*, which can be readily ascertained. The genus *Tri-*

pudia may be identical with *Oribates* of Hy. Edwards, described more recently. I have seen the type of *O. Versutus*, and, without being able to compare it, it seemed to me identical with my previously published *Tripudia flavofasciata* Grote, CAN. ENT., 1877, p. 69. The type of *Tripudia* is this species, to which I have joined *quadrifera* of Zeller, from Texas, as a second. Whether the orange species *Muirii* and *limbatus* belong here can be ascertained by proper dissections, which should be undertaken as soon as possible.

The species of *Spragueia* have received two interesting additions since the publication of the List. The first of these is *Pardalis*, collected in Florida by Mr. Thaxter. It is allied to *dama* by the orange fringe of primaries interrupted with dark opposite the cell. The costal spots are smaller and pale; the wing is blacker and there is a pale costal spot at base, wanting in its ally.

The second species is *Funeralis* from Arizona, collected by Mr. Doll. It is of a peculiar silky dark leaden hue, with concolorous fringes. A large pale spot outside the t. p. line on costa. Two pale bands enclosing orange lines and swelling into wider spots at costa, where the outer band encloses a dark streak. The species are similarly sized and are very interesting from their brightly marked and narrow primaries. While recalling the European *Erotyla sulphuralis* in ornamentation, they are structurally distinct, as I have shown (l. c.). Our North American species are now as follows:

SPRAGUEIA Grote.

<i>onagrus</i> Guen. Fla.	<i>dama</i> Guen. Ala., Tex.
Type <i>leo</i> Guen. Ala.	<i>pardalis</i> Grote. Fla.
<i>plumbifimbriata</i> Grote. Tex.	<i>guttata</i> Grote. Tex.
<i>funeralis</i> Grote. Arizona.	<i>tortricina</i> Zell. Tex.
	? <i>apicella</i> Grote. Ala., Tex.
	= <i>truncatula</i> Zell.

A NEW SPECIES OF ICTHYURA.

BY G. H. FRENCH, CARBONDALE, ILL.

ICTHYURA PALLA, n. sp.

Length of body, including anal tuft, .56 of an inch. Expanse 1.10 inches. General color of body and primaries pale gray, the latter rather sparsely sprinkled with dark brown scales. Palpi brown above, scarcely

projecting beyond the head, third joint concealed by the hairs of the others. Front slightly brownish, a tuft of pale gray scales at the base of each antenna, the usual deep brown mark from between the antennæ to the top of the thoracic crest. Primaries with the usual transverse lines almost white. The basal line makes a bend outward on the median vein; from this it goes in a straight course to the submedian vein; from this to the posterior or inner margin it curves a little outward. A second line extends from the costa about one-fourth of the distance from the base obliquely to the posterior margin, near the posterior angle. A third line passes straight across the wing from the posterior margin to the second, a little below the median vein. The fourth begins as a white spot on the costa a little more than two-thirds of the distance from the base, and joins the second on the posterior margin, making the usual "V" as in the allied species. The fourth line is slightly S-shaped in its costal third. Outside the fourth line is a subterminal, somewhat zigzag row of black spots, some of which are often faint or obsolete. In the discal cell there is usually a faint oblique line that seems to be a continuation of the third line, though it does not reach the costa, and the end of the cell sometimes appears like a short line. There are three oblique shades of brownish olive more or less distinct, that cross the wing parallel to the second line; the first, beginning on the costa inside the basal line, faintly borders that line to the submedian vein, and is seen below that vein on the third line; the second outside the second line through its whole course, is darkest next the line; the third from both sides of the fourth line to the middle of the outer border, faint, except along the line. Just outside the S-part of the fourth line are three grayish-yellow spots with a few reddish-brown scales. Secondaries pale smoky gray with a faint whitish line from the fourth of the primaries (as the wings are spread) to the anal angle. Under side, the primaries are about the color of the secondaries above, pale along the costa and terminally, the secondaries paler with a dark transverse line.

Described from 2 ♂ and 3 ♀, all reared specimens.

Larva.—Length 1.25 inch when crawling, body nearly cylindrical, two black tubercles, close together, on the top of joints 3 and 11. On the dorsum are four bright but narrow yellow lines alternating with narrow black ones. The stigmatal line black; above this, or the subdorsal space, an irregular alternation of black and white. Below the stigmata a narrow

yellow line ; below this, or the substigmatal space, the body is flesh color. Head shining black. There are a few gray hairs scattered over the body.

These larvæ were found feeding on willows through the most of September, resting in an enclosure formed of several leaves fastened together at the ends of twigs, but I did not find more than half a dozen in a nest. Those put in breeding cages pupated before the middle of October, mostly in the corners of the boxes. The first hatched April 22, 1881, the last May 8. I took one fresh specimen that had flown to light May 28.

This form is related to *Inclusa* Hub. and *Ornata* G. & R., more nearly to the latter in size and coloration, but differs from both in several particulars. Besides size and color, it differs from *Inclusa* in the coloring of its larva. It differs from *Ornata* in the color of the scales sprinkled over the primaries, the color of the spots outside the fourth line, and the continuance of that line, as it is not here partially obsolete opposite the disc, as well as in some other points. The apices are no more produced than in *Inclusa*, nor is the costa more bent.

ON THE CHALCIDIDÆ OF FLORIDA.

(*Paper No. 2.*)

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

Genus EUPELMUS, Dalman.

Prof. Westwood, in his *Generic Synopsis*, characterizes this genus as follows: "Antennæ 13-jointed, clavate, third and fourth joints minute; club ovate; thorax long-ovate; collar moderate; thorax depressed in the middle; abdomen long-ovate; *ovipositor exerted*, wings with stigmal branch distant from the union of the subcostal nerve and the costa."

In view of the recent controversy between Prof. Riley and Mr. Howard, in regard to this genus and the genus *Antigaster* of Walsh, I deem it advisable to publish the above from Westwood, *verbatim et literatim*. Just beginning my entomological studies, I do not pretend to take issue with either of these gentlemen, but merely desire to draw their attention to the *ovipositor* in this genus, which both seem to have entirely overlooked, and which, according to above description, is *exserted*.

Now, I have bred a great many specimens of *Antigaster mirabilis* from eggs of *Microcentris retinervis*, and neither this species nor those recently

described by Mr. Howard, have exerted ovipositors. Does this not throw some light on their generic position?

I describe below two new species belonging to *Eupelmus* genus, if Westwood's definition of it be correct. I must acknowledge, however, that the antennæ, wings and formation of thorax strikingly resemble *Antigaster*. The exerted ovipositor would, however, easily distinguish them.

EUPELMUS ROSÆ, n. sp.

♀. Length .10 inch; ovipositor .02 inch. Head wider than thorax, greenish-golden, finely transversely punctate and with slight purplish reflections; front purplish, with metallic reflections, beneath eyes greenish and with the punctures converging towards mouth; eyes purplish; antennæ 10-jointed, clavate, scape metallic green to near tip, flagellum black, joints 6 to 9 shorter than the rest and about equal in length; thorax long ovate, collare short, corners bulging, praescutellum depressed, depression extending from corners of collare and converging and uniting towards scutellum, greenish golden, finely transversely punctate and with purplish reflections; the triangular pieces back of praescutellum are greenish with edges well rounded; scutellum highly convex, longer than broad, greenish with posterior half purplish; the side piece is one elongate convex surface extending from before the insertion of the wing to hind coxæ, purplish, with greenish metallic reflections; wings hyaline, iridescent, with yellowish veins; the subcostal joins the costa at less than one-third the length of wing, the vein then extending to more than two-thirds, with a thin stigma near tip; hind wings strongly iridescent; abdomen long-ovate, slightly depressed, purplish black, with slight cupreous and metallic green reflections; ovipositor black, annulated with yellow in the middle; legs—coxæ black, trochanters yellowish, fore and middle femora and tibiæ yellowish, the middle pair slightly dusky in the middle; all tarsi, except at tip, white; posterior femora and tibiae, excepting at knees and tip, which are yellowish, black; a short tarsal spur; tarsi white, brownish towards tip, basal tarsal joint of middle pair of legs slightly widened.

Described June 17th, from one female specimen bred from Cynipidous rose-gall, *Rhodites r. lucida* (Ashmead MS). A gall found on a wild rose bush growing along the borders of our rivers and swamps.

EUPELMUS CYNIPIDIS, n. sp.

♀. Length .15 inch; ovipositor .05 inch. Head slightly wider than

thorax, greenish golden, with the surface crackled and sparsely covered with short fine hair; eyes brownish purple: antennae 10-jointed, black; thorax elongate ovate, greenish brassy with a slightly elevated, golden, finely transversely punctate shield in centre, extending from collare to two-thirds length of praescutellum, with the posterior end rounded, a depression on either side running squarely off posteriorly perfectly smooth and shining; the scutellum small and convex, with the triangular praescutellar pieces, almost joining, so closely do they press against it; it is brassy but ends posteriorly in a small, flattened, triangular point; abdomen purplish black, flattened above, keeled below; ovipositor at base for one-fifth the length purplish black, balance reddish brown; wings hyaline, veins yellowish to juncture of subcostal with costa, balance brown, a large smoky brown blotch extending across the entire wing from one-fourth the length to near the tip of the wing; legs uniform reddish brown.

Described from one female bred specimen, bred May 2nd, from Cynipidous live-oak gall, *Cynips q. batatoides* Ashmead.

Genus COCCOPHAGUS, Westwood.

COCCOPHAGUS ANNULIPES, n. sp.

♀. Length .04 inch. Vertex of head red, ocelli black and triangularly arranged; eyes greenish, face and around mouth parts green, mandibles tipped with black; antennae 9-jointed, clavate, scape somewhat widened, black, 2nd joint larger than 3rd and 4th, basal half black, apical half greenish yellow, joints 3 and 4 small, red, others gradually widening to club, greenish yellow, club large and black; thorax longer than abdomen, collare very narrow, greyish or greenish; mesothorax red, praescutellum transverse, occupying the whole dorsum; scutellum very large and triangular, the base being as broad as the praescutellum, both sparsely covered with short whitish hairs; beneath, the surface, with the coxae, femora and tibiae are the color of milky water, tibiae annulated with two black bands, tarsi yellowish, ungues black; abdomen obtusely pointed, blackish above, greyish and with an ovipositor-groove beneath; from a stigma on each side issue three long black hairs; wings hyaline, closely covered with short hairs, veins yellowish.

This unique little species was bred from a large brown Coccid scale (*Lecanium* sp.) occurring on *Quercus aquatica*, and the description is made from two female specimens, which hatched April 17th.

CORRESPONDENCE.

EXPERIMENTS WITH YEAST IN DESTROYING INSECTS.

We are indebted to Dr. H. A. Hagen, of Cambridge, for the following letter and the subsequent remarks on this interesting subject :

Kingsworth, Ashford, Kent, Dec. 27, 1881.

DEAR SIR,—

I beg to thank you very much for your letter, dated Nov., 1880, respecting the application of yeast for destroying insect pests. During the past season I have endeavored to follow the instructions contained therein, and as you express a wish to hear of my success or failure, I will attempt to describe my experiments as clearly as possible. As soon as Aphides became noticeable, I procured some German compressed yeast, dissolved an ounce in a little warm water, added a little coarse sugar, and set it to ferment. In about 24 hours I added sufficient water to make up a gallon, and with this syringed a cherry tree attacked by black Aphides. This was on the 16th of June. Four days later I found the tree almost clear of living Aphides, though their dead bodies, or cast skins (I could not ascertain which, although I asked the assistance of an entomological friend) smothered many of the leaves. One remarkable point in this experiment was that a small branch of the tree, loaded with Aphides, hung over a window, and at the request of my wife, I abstained from syringing it. Here the insects remained perfectly healthy, and after a few days were seen to work down the tree and attack the young shoots that had been washed clean. On June 29th I again dressed the tree, and this time destroyed or drove away every Aphide. I may add that the larvae of several Aphidivorous insects were present on the tree, and did not appear greatly affected by the application. Encouraged by the apparent success attending the application, I commenced operations, June 20, on a second cherry tree. This, however, was heavily leafed, and I could not make so much impression, but they evidently did not like the dressing, for they disappeared entirely soon after the second application. I also tried the yeast for Aphides on Guelder Rose (*Viburnum*), Elder (*Sambucus*), Field Bean, and some other plants; also for Currant Grub, but could make no decided mark anywhere. With respect to the Currant and Gooseberry Grubs, the liquid ran from off their bodies clean, and I found it almost impossible to saturate them with it. If the syringing was persisted in, they

would release their hold and fall to the ground, but very shortly crawl up again. To conclude, I was delighted with the apparent success of my first experiment, but all subsequent trials were so discouraging that I fear yeast is too uncertain in its action to supersede many of the washes we have already in use. Again thanking you for your kind letter, I beg to subscribe myself, sir,

Yours most respectfully,

THOS. H. HART.

To Dr. H. A. Hagen, Cambridge, Mass., U. S. A.

This interesting letter by Mr. Thos. H. Hart, who owns nurseries and greenhouses, allows the following conclusions :

I. It is doubtless true that in the experiments of June 16 and 20, the Aphides were killed, as upon the branch not syringed they remained in perfect health.

II. It is doubtless true that the later experiments were a failure.

III. It seems evident that the yeast has not contained *Isaria*, or other fungi obnoxious to insects, to which the first success could be ascribed ; otherwise the later application of the same fluid ought to have had the same effect, or even by the multiplication of the fungi, a more marked effect.

Experiments made in Germany and here had exactly the same result, first success, later failure. In Germany it was made on a jasmine, in a flower pot, and the previously rather sick plant was in 1881 in good health and perfectly free of Aphides. Some currant shrubs on the left side of my house were entirely free through the whole year (without fall generation) after the experiment, though similar shrubs on the right side of my house were badly infested with currant worms ; I had here purposely not applied yeast. After all I believe it can be concluded that a *certain stage* of the yeast solution is needed to make it effective, and that after this stage it becomes indifferent. That yeast solution has killed insects seems to be undoubtedly proved, and it remains only to find out the stage in which its application is successful. It is sure that success, even in a very small number of experiments, cannot be annihilated by failure in other experiments.

H. A. HAGEN.

PIERIS RAPÆ IN NEBRASKA.

DEAR SIR,—

I am sorry to note the appearance of *P. rapæ* in Nebraska. August 3rd, 1881, I first saw a living specimen ; needless to add that it was busily

engaged in a cabbage patch. Others soon appeared, and before cold weather set in it had become quite abundant and larvæ in an advanced stage of growth were found in November. Probably the butterfly crossed the Missouri in the summer of 1880. We are here thirty-five miles west of the river, a distance that could hardly have been traversed in one season. It also appears that the cabbage crop has been almost totally destroyed in the eastern part of Dodge County and farther east, while here a partial crop has been secured notwithstanding the visit of the imported pest, supplemented by an unusual abundance of the Cabbage Plusia. August 1st, 1873, when I left my former home in Bureau County, Illinois, *rapæ* had not yet reached that place; therefore in less than eight years its westward progress upon this parallel has taken it across the State of Iowa and the Mississippi and Missouri Rivers.

The question naturally arises—Will the insect stop short when it reaches the grassy plains of Western Nebraska, or will it press onward to the cabbage gardens of Utah and the Western slope? By the aid of man it might soon cross the plains, even if it subsisted wholly upon cabbages; but being not averse to other cruciferous plants, it will find its way made easy. A mustard-like plant of this family with pink flowers grows along the embankment of the Union Pacific Railway, nearly if not quite throughout the whole distance from Omaha to Ogden. At Ogden Junction it is the most abundant of wild plants. If this plant furnishes a suitable food, *P. rapæ* will have little difficulty in surmounting all obstacles that bar its progress toward the valley of the Salt Lake.

G. M. DODGE.

Glencoe, Dodge County, Nebraska.

EXCHANGES.—I would like very much to effect some exchanges with Entomologists in Canada in Lepidoptera. I have a great quantity of good material in duplicate from our Adirondack region, from the South and West, and from Europe.

W. W. HILL, Albany, N. Y.

DONATION.—We desire to return our sincere thanks to Prof. J. T. Bell, of Belleville, who has kindly sent to our Society a number of very interesting mounted microscopic objects, including Polycistina and Diatomacea from Vancouver Island—a most useful addition to the cabinet of objects in our rooms.

The Canadian Entomologist.

VOL. XIV.

LONDON, ONT., MARCH, 1882.

No. 3

ENTOMOLOGY FOR BEGINNERS.

THE POLYPHEMUS MOTH—Telca Polyphemus.

BY THE EDITOR.

The caterpillar of this insect is also known as the American Silk Worm, in consequence of its having been extensively reared for the sake of its silk. When full grown the larvæ presents the appearance shown in

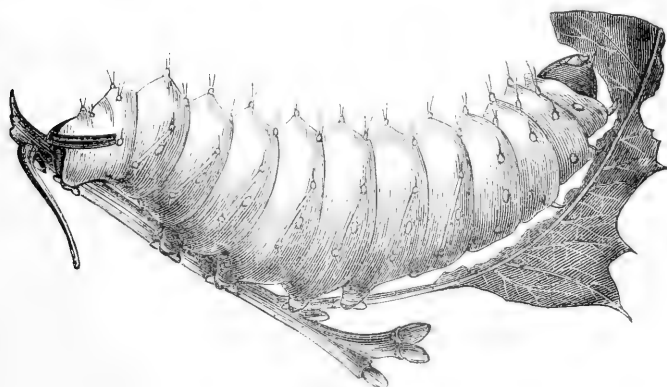


FIG. 4.

figure 4, is over three inches in length, with a very thick body. It is of a handsome light yellowish-green color, with seven oblique pale yellowish lines on each side of the body; the segments, which have the spaces between them deeply indented, are each adorned with six tubercles, which are sometimes tinted with orange and have a small silvery spot on the middle, and from each one of which arise a few hairs. The head and anterior feet are pale brown, the spiracles pale orange, and the terminal

segment bordered by an angular band resembling the letter V, of a purplish-brown color.

When mature the caterpillar proceeds to spin its cocoon within an enclosure usually made by drawing together some of the leaves of the tree it has fed upon, some of which are firmly fastened to the exterior of the structure. The cocoon, fig. 5, is a tough pod-like structure, nearly oval in form and of a brownish-white color, and within it the larva changes to an oval chrysalis of a chestnut brown color, represented in fig. 6.

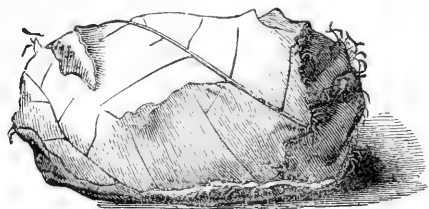


Fig. 5.

Usually the cocoons drop to the ground with the fall of the leaves, and in this state the insect passes the winter.

Late in May or early in June the prisoner bursts its prison house, when there is revealed a large and most beautiful moth, the male of which is well shown in fig. 8, p. 44, the female in fig. 9, p. 45. The antennæ are feathered in both sexes, but more widely so in the male than in the female. The wings, which measure when expanded from five to six inches across, are of a rich buff or ochre yellow color, sometimes inclining to pale grey or cream color, and sometimes assuming a deeper, almost brown color. Towards the base of the wings they are crossed by an irregular pale white band, margined with red; towards the outer margin is a stripe of pale purplish white, bordered within by one of deep, rich brown. Near the middle of each wing is a transparent eye-like spot, with a slender line across the centre; those on the front wings are largest, nearly round, margined with yellow, and edged outside with black. On the hinder wings the spots are more eye-like in shape, are margined with yellow, with a line of black edged with blue above, and the whole set in a large oval patch of rich brownish-black, the widest portion of the patch being above the eye-spot, where also it is sprinkled with bluish atoms. The front edge of the fore wings is grey.

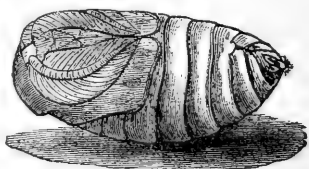


Fig. 6.

This lovely creature flies only at night, and when on the wing is of such a size that it is often mistaken in the dusk for a bat. Within a few

days the female deposits her eggs, glueing them singly to the under side of the leaves, usually one only on a leaf, but occasionally two or even three may be found on the same leaf.

The egg is about one-tenth of an inch in diameter, slightly convex above and below, the convex portions whitish, and the nearly cylindrical sides brown. Each female will lay from two to three hundred eggs, which hatch in ten or twelve days.

This insect is subject to the attack of many foes, particularly while in the larval state. A large number fall a prey to insectivorous birds, and they also have insect enemies. A large ichneumon fly, *Ophion macrurum*, see fig. 7, is a special and dangerous foe. This active creature may often be seen in summer on the wing, searching among the leaves of shrubs and trees for her prey. When found she watches her opportunity, and places quickly upon the skin of her victim a small, oval, white egg, securely fastened by a small quantity of a glutinous substance attached to it. This is repeated until eight or ten eggs are placed, which in a few days hatch, when the tiny worms pierce through the skin of the caterpillar and begin to feed on the fatty portions within. The *Polyphemus* caterpillar continues to feed and grow, and usually lives long enough to make its cocoon, when, consumed by the parasites, it dies; in the meantime the ichneumons having completed their growth, change to chrysalids within the cocoon, and in the following summer in place of the handsome moth there issues a crop of ichneumon flies. It is also subject to the attacks of another parasite, a tachina fly. Should the insect ever appear in sufficient numbers to prove troublesome, it can be readily subdued by hand-picking. This larva feeds on a variety of trees and shrubs, such as plum, oak, hickory, elm, basswood, walnut, maple, butternut, hazel, rose, &c.

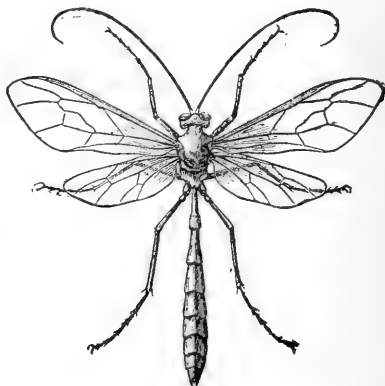


Fig. 7.

As this moth has been found to be easily propagated, extensive experi-

ments have been tried with the view of producing silk for commercial purposes from the cocoons. The silk is rather coarser than that of the

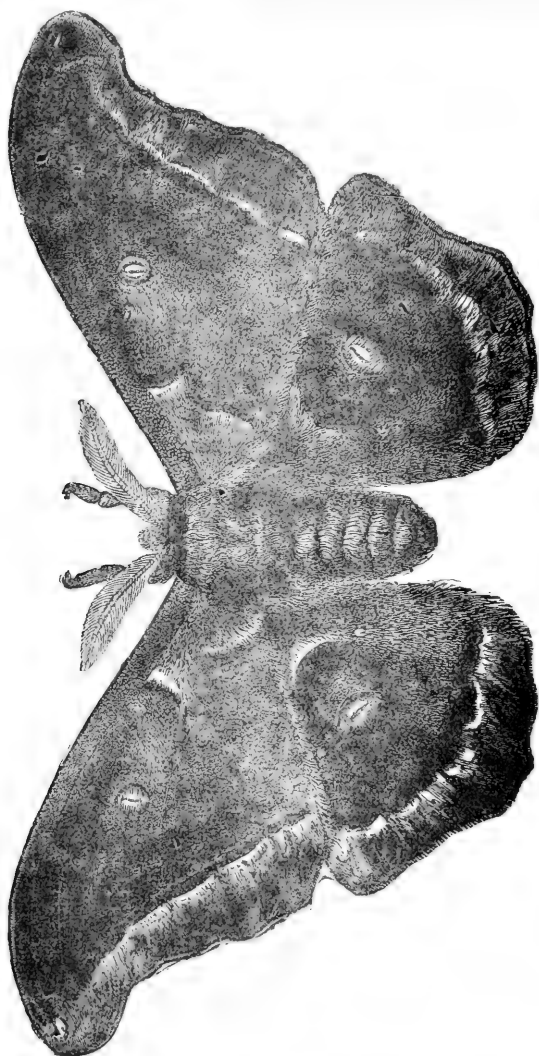
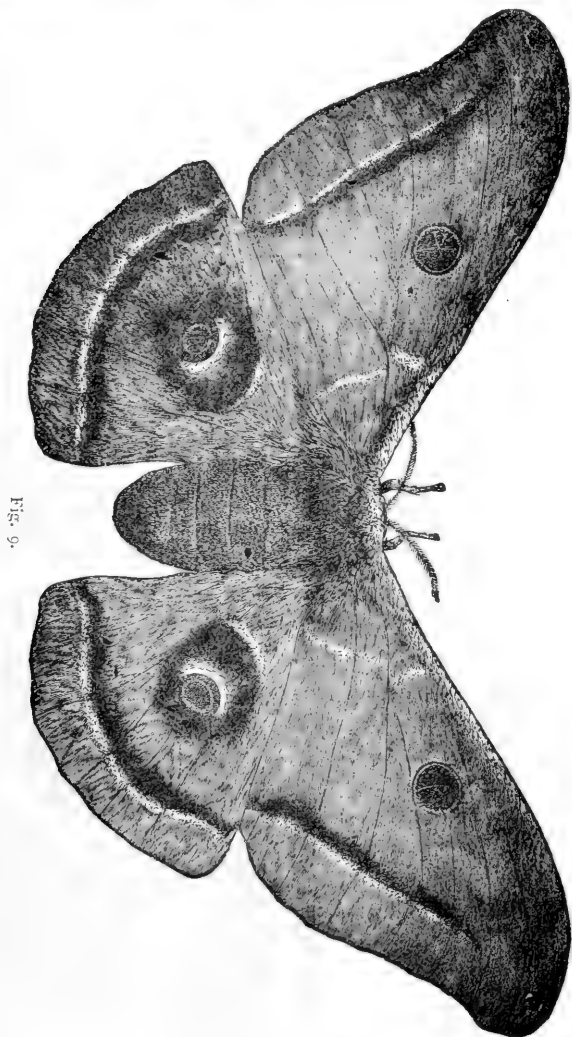


Fig 3.

common silk worm, *Bombyx mori*, has a continuous thread, and can be readily unwound. A measure of success has attended these efforts, but

not sufficient, it appears, to secure their continuance, and we know of no one now raising these larvæ for the purpose of obtaining silk for com-



merce. The insect has also been introduced into France with a similar object, but with what success we have not learned.

EUROPEAN WRITERS ON NORTH AMERICAN MOTHS.

BY A. R. GROTE.

For more than twenty years I have been endeavoring to complete the synonymy of our moths, and to find out what species were covered by Walker's and Guenee's descriptions. During this time I have made three trips to Europe, with this object more or less directly in view. Comparatively few of M. Guenee's species remain unknown to me; and as many of these were collected by Doubleday, the types will probably be found in the British Museum. Mr. Guenee's descriptions of species are good, and among the best extant, but he does not give structural characters. The microscope was not used by him. His genera contained incongruous material. When he had a species that he did not know what to do with, instead of making a new genus for it, which would have assisted the identification of the species, he often made a group of it, under a genus to which it was opposed in every structural feature—and the species in this way was readily over-looked. As, for instance, *Leucania Littera*.

Mr. Walker's descriptions are entirely misleading, because his types prove that he made no serious study at all of the matter. No system whatever has been followed by him in locating his material; not even casual resemblance has been used as a guide. In my last work on the *Noctuidæ*, written in London, and with Mr. Walker's collection before me, I became satisfied that it would take over a year's steady work, glass in hand, to settle all the questions raised by his determinations. Not only have his types to be gone over with his descriptions, but his identifications of Guenee's species have to be compared with that author's writings. Although in Guenee's genera, such as *Hadena*, *Leucania*, *Aplecta*, *Mamestra*, species with naked or hairy eyes, spined or unspined legs, etc., are thrown indiscriminately together, yet some sort of system, i. e., casual resemblance, and often a knowledge of the larva, has been recognized in his work. All this is wanting in Mr. Walker's work; the specimens appear to have been described just as they came along. The genus *Bryophila* is not very hard to recognize; the species are slender bodied with flattened scales on the thorax; yet Mr. Walker describes three American species under this genus all different generically, and none belonging to *Bryophila*. Species belonging to *Agrotis* are described by him, up and down all over the family under all sorts of genera. Some of

his types are in very bad condition ; and sometimes the condition of the specimen is taken as a specific character. The same species is described in the same drawer several times over. It is absolutely impossible to find out what principle has guided Mr. Walker in his work. If the species had been sorted out just as they came along, and then described, I do not sincerely think the effect would have been much worse ; provided the material had previously been sorted into families. And yet, even here, there are a large number of mistakes. There are plenty of *Bombycidae* and *Noctuidae* among his *Geometridae*. For twenty-five years Mr. Walker's work has been a real obstacle in the way of American Entomologists. Through my different visits a certain number of his species have been made known ; but it is impossible for a private person, with my means, to finish this work. Every day that the British Museum allows Mr. Walker's work, which it published and paid for, to remain uncorrected, it continues to inflict as much injury upon the progress of this branch of science as it is possible to do.

I take this opportunity to thank Mr. Butler for his very kind and welcome assistance in the preparation of my Essay on the North American Noctuidæ, which is being printed in London. *

NOTE ON CATOCALA WALSHII.

BY A. R. GROTE.

After a comparison of my types with Mr. Walker's, Mr. A. G. Butler writes me that *Walshii* *Edw.*, as taken by Prof. Snow in Kansas, is the same as *Functura* of Walker. The form which has been taken about Albany and which is exactly like *Unijuga*, but differs by the band being a little narrower on hind wings and not quite so continuous, is an unnamed variety of *Unijuga*. It follows from this that my *Arizona* is certainly not *Walshii*, as suggested by certain parties. Mr. Neumoegen has received it in quantity from Arizona. The form taken by Belfrage in Texas, and distributed as *Walshii*, may be the same as *Arizona*, and should be carefully compared with Arizonian specimens. In any case it becomes now additionally probable that my suggestion that *Aspasia* is a re-description of *Arizona* is correct, and if any one will take the trouble to compare the descriptions the reasonableness of my suggestion will become apparent. On account of the pinkish or red hind wings and the brown primaries, both species were naturally compared with *amatrix*. The amount of variation in color of hind wings in this genus is not yet ascertained.

ON SOME CHALCIDIDÆ.

BY G. H. FRENCH, CARBONDALE, ILL.

In the January number of the CANADIAN ENTOMOLOGIST I described two new species of this interesting family under the names of *Isosoma Allynii* and *I. Elymi*. Professor C. V. Riley, to whom a pair of the first were sent, writes me that they belong to the genus *Eupelmus* instead of *Isosoma*. From a re-examination of my specimens I think he is correct, and the species will be known as *Eupelmus Allynii*, instead of as first described. They have 11 joints to the antennæ, and the prothorax short.

Since writing the descriptions above referred to I have had a number of wingless insects hatch from my wheat straws, and it is now evident that the description of chrysalids, and perhaps larvæ, as given under *Isosoma Allynii*, can not apply to that species, but to these wingless specimens. In a recent letter Professor Riley states that he has bred wingless specimens of an *Isosoma* from wheat received from Kentucky, and it is probable these are the same. I am inclined to think they belong to *Isosoma Elymi* that I obtained from the stalk of *Elymus Canadensis*, though it will be difficult to say positively without more specimens of *Elymi* or winged specimens of the other. The wingless ones are from .10 to .11 of an inch long, inclusive of ovipositor, while the winged *Elymi* I have is .07 of an inch. Premature development might account for the difference. They agree in the following points. Both have 9-jointed antennæ with whorls of hairs at the base of the joints, the antennæ black except the base, which is fulvous, the darkest in the winged specimen. The legs have the femurs and tibiæ fuscous, the joints fulvous, the feet, all but the terminal joint, brownish yellow. Abdomen jet black, the ovipositor and hairs brownish, the hairs arranged chiefly at the sutures of the joints. Head and thorax dull or brownish black, coarsely punctured, the eyes piceous, a fulvous spot on dorsum and sides of the prothorax and similar marks under the thorax. Where there are light markings those on the wingless specimens are a little paler than the corresponding ones on the winged specimen from which my description of *I. Elymi* was taken.

On the other hand, I have now (Feb. 9) larvæ inside stalks of *Elymus Canadensis*. Will they produce *I. Elymi* or something else? Rearing them to the imago will alone tell, and that may help to settle the other

question. I may say in conclusion that I have bred a specimen of *Eupelmus Allynii* from a gall that was probably made by *Isosoma Hordei*, hence there is a probability that the specimens I bred from the wheat stalks were parasitic on the larva of our wingless *Isosoma*.

NOTES ON CERTAIN BUTTERFLIES. THEIR HABITS, ETC.

No. 2.

BY W. H. EDWARDS, COALBURGH, W. VA.

8. On Young Caterpillars Eating their Egg Shells.

Mr. Scudder, *Butterflies*, p. 101, says, after describing the way in which the caterpillar eats out of the egg: "The taste he has gained of egg-shell seems to allure him; for, strange as it may seem, although placed by the provident parent within immediate reach of choice and succulent food, *he will not taste it until he has devoured the last remnant of his prison-walls*. Strange food this for a new born babe! The act, however, is plainly a provision of nature by which the tender animal is rid of a sure token to his enemies of his immediate proximity." Surely here is an error in fact, and a wrong conclusion whatever the fact may be. I read the above statement on the 25th July last, and at once went to my garden to search for eggs of *Libythea Bachmanni*, on Hackberry leaves. The young caterpillars of this species are green, of a shade so near that of the leaves they feed on, that it is very difficult to discover them. Even where the tip of the leaf has been eaten, and their presence is suspected, it is easy to overlook them. I found at once three eggs and one young caterpillar. The egg from which this caterpillar had come was present at the base of the leaf on the extreme tip of which the little creature rested. A hole was in its side near the top, and no more had been eaten than just enough to permit egress. Repeatedly, in the next succeeding days, I found eggshells of *Bachmanni*, each with an opening like that described, and usually, on the leaf above was the caterpillar. So that here is one species which does not devour the last remnant of its prison-walls—perhaps no part thereof. And instead of ridding itself of a sure token of its presence to its enemies, quite the contrary happens, for the empty shell left at the

base of the leaf is a token by which an enemy, or a good friend in the form of an industrious naturalist, may find it.

The fact is, so far as my observation goes, and besides what I had noticed in a general way for years, I paid particular attention to this matter of eating the egg shells for the rest of last season, caterpillars very rarely eat up the shell so completely that one cannot discover some remains of it. *Papilio Ajax* usually leaves that part which is cemented to the leaf. The Graptas nibble about the tops a little, but leave the greater part of the shell. *Lycaena Pseudargiolus* eats its way out at the depressed summit, and sometimes eats a little of the upper part of the shell. I had two score eggs of two species of *Lemonias*, viz., *Palmeri* and *Nais*, which came last summer from Arizona, giving caterpillars after they reached me. In every case the egress was by a round hole bitten out of the top, as in *Lycaena* (the eggs much resembling *Lycaena* in shape), and the caterpillar could scarcely squeeze through, so small was it. Not a bite from the shell was taken afterward.

As to why caterpillars eat their egg-shells at all, an eminent authority writes: "It is to save the labor of building up new chitine, that substance being here at hand in the shell."

9. On the Appearance of Albinic Females of *COLIAS PHILODICE*.

Mr. Scudder, in same work, page 183, says: "It is a curious fact that *these pale females never appear in the early spring brood*, and increase in proportion as the season advances. This is in harmonious contrast with the occurrence of a melanic male in the spring brood of *Lycaena Pseudargiolus*; when we consider that albinism is a northern, melanism a southern peculiarity, we should anticipate albinism in the cool, melanism in the hot season."

In Butterflies N. A., vol. 2, text of *Colias Eurytheme*, I speak of albinic females of that species: "Albinic females appear in every brood, as in *Philodice*. In that species (*Philodice*) these females are as common in the early spring brood as in any of the later ones; and judging by the number of albinos received by me from many quarters, the same is true of *Eurytheme*." In case of *Eurytheme*, the distinction between the spring form (*Ariadne*) and the later forms (*Keewaydin* and *Eurytheme*) is so marked, that an albino specimen received can be allotted to one or the other with certainty. There is not such distinctness between the early and late broods of *Philodice*, and my statement on the occurrence of

albinic females in spring was based, not on dried specimens, but on personal observation. Such females are seen by me here, at Coalburgh, every spring. I took one in my net early in 1881, thinking before I struck it that it was a large *P. Rapae*, and same day I saw another. In my note book I recorded, 1874, 8th May, that I took an albino female *Philodice*. But as it might be said that albinos were to be expected at the south, but still were not to be found at the north, I wrote Mr. Lintner for such information as he could give on the matter. He replied, 27th July, 1881: "I was at Albany yesterday and a friend showed me a beautiful white female *Philodice* taken near Centre, on May 15th. 'On 20th June, he took six more.'" So that albinic females do appear in the early spring brood, in New York as well as in West Virginia, and the foregoing generalization is erroneous.

10. Upon Certain Alleged Peculiarities in the History of SATYRUS ALOPE.

Mr. Scudder says, l. c., page 132, it "first appears on the wing in the early half of July. . . . The females live a long while before depositing a single egg; the earliest record I have of this event is the 22nd of August, or *from five to six weeks after the first appearance of females*; they continue to lay eggs until the end of the first week in September; and in *keeping with the indolence of the females* is the duration of the egg state—from 3 to 4 weeks, a period longer than in any butterfly known to me where the eggs hatch at all the same season. The earliest caterpillars therefore appear by the middle of September," etc. I spent some time at Martha's Vineyard, Mass., in July, 1877, at Oak Bluffs, and on the grassy plains back of the town I searched daily for butterflies. The first *Alope* seen were 2 males, and they were just from chrysalis, 23rd July. On 26th, the first female was seen, and I took 12 ♂, 1 ♀. I then left the Vineyard and Mr. Mead came there just at that time, and set to work to obtain eggs of *Alope* for me. On 10th Aug., or 15 days after the first female had been seen by me, he began to shut up females in a bag over a plant of grass in a tin can, and 22nd Aug., at Coalburgh, I received from him 125 eggs, laid prior to Aug. 18th. These began to hatch 27th Aug., or 17 days after the first female was enclosed. This certainly is not a long period for the egg as compared with some other butterflies, especially the large species of *Argynnis*. The period of *A. Cybele* I have found to run from 12 to 24 days; of *A. Diana* 15 to 26; *A. Idalia*, 25; *A. Alcestitis*, 27

and 29 days. On the other hand, I have had eggs of *Alope* and *Nephele* from several localities, and the periods of this stage have run from 14 to 28 days. It depends much on the weather how long the egg period shall be, whether it be a *Satyrus* or *Argynnis* egg, and it is hardly right to charge the females of *Alope* with special indolence of habit. Their eggs are laid, so far as my observation goes, as soon after emergence of the female from chrysalis, as are the eggs of the larger *Argynnis*, and hatch as speedily.

11. On Eggs of *THECLA CALANUS*.

It is stated, l. c., page 128, that the eggs of *Calanus* "are laid towards end of July and early in August; *these eggs remain unhatched until the following spring*, when the caterpillar emerges, feeds on oak leaves, changes to chrysalis in June and July, and after a fortnight the butterflies of the new year appear." I should much like to see evidence to support this statement. Mr. Saunders, at London, Canada, *Can. Ent.*, vol. 1, p. 57, says of this species, which he calls by its synonym *T. inorata* G. & R. (= *T. Falacer* B. & L.): "About the middle of July, 1868, two eggs were deposited on the sides of a pill box. This box was overlooked for several days, and when examined again, the larvæ were found to have escaped and dried up for want of food."

Mr. C. E. Worthington, at Chicago, writes me: "I took examples of *Calanus* the last days of June, and confined on a branch of oak. The eggs were laid, and hatched during the first week in July, and the larvæ died a few days after. *Calanus* is our commonest species. My memoranda of captures are June, July, September."

It is certain then that *Calanus* eggs laid in June and July hatch in a few days, in Canada and Illinois, and that in the latter the species is double-brooded. If eggs are laid in September, they may possibly hibernate, or the caterpillars may, or the chrysalis, and to this date apparently no one knows which of these stages hibernates. My opinion is that it is the chrysalis, as with other American species of this genus.

12. On the Number of Larval Segments.

Authors have recognized 13 segments, counting the head as one (*vide* Burmeister, Westwood, &c.) Mr. Scudder, page 17, says: "The body, or the portion of the caterpillar *lying back of the head*, is composed of thirteen segments." I find no explanation of this thirteenth segment, nor

directions where to look for it. It does not appear to be visible. Twelve after the head are distinctly seen in all the large lepidopterous larvæ, and any one can satisfy himself of that if he will examine a caterpillar of one of the large Bombycidæ or Sphinges. The segments are distinct in many butterfly larvæ, as for example, *D. archippus*. Now on page 82, Mr. Scudder gives a magnified figure of the larva of *Archippus* from Burgess, in which the thoracic segments are numbered 1 to 3, and the abdominal 1 to 9, making 12 without the head. On page 19 we read: "Among the butterflies these appendages (pro-legs) are always borne by the 3rd to the 6th abdominal segments, and by the last segment, leaving thus a *similar space without support between the true and false legs, and between the terminal and preceding false legs.*" Plainly this accounts for but 12 segments, as these "similar spaces" are two segments in each case. Three thoracic, bearing legs, 2 segments "without support," 4 with false legs, 2 more "without support," and the "terminal" segment. That is 12. I should have regarded the statement that there were 13 segments without the head as an error of the printer; but on page 239, the author undertakes to conceive a picture of the primeval butterfly, and says: "The caterpillar had a rounded head, a body composed of 13 segments," &c. Therefore I should like an explanation, and a hint as to where one is to look to find this 13th segment. It is hardly necessary to count segments which are invisible to the naked eye.

13. On Apaturas "*Herse*" and "*Lycaon*."

In 1833, Boisduval and Leconte, in *Lep. de l'Amer. Sept.*, described and figured two species of Apatura as *Celtis* and *Clyton*, and for more than a generation these names were unchallenged. In 1869, Mr. A. G. Butler, in his *Catalogue of Di. Lep.*, described by Fabricius in the *Collection of the Brit. Museum*, introduced *Lycaon* ♂ and *Herse* ♀, *Fab. Ent. Syst.*, as of one and same species, and remarked: "This species is well figured in Jones's unpublished '*Icones*'; it comes very near a new species figured by Mr. Edwards" (*A. Alicia*). All that Fabricius himself knew of these species was from the drawings, so far as appears, and his description is taken directly from the drawings. What part of the globe the butterflies came from he did not know, as in both cases he says "*Habitat —.*"

In 1871, Kirby's *Catalogue* followed Butler, giving *Lycaon* as ♂, *Herse* as ♀, of one and the same species, but not one identical with either *Celtis* or *Clyton*. In this *Catalogue*, *Lycaon* stands No. 34 and *Celtis* No. 38 in

the series, two tropical species intervening with others. No locality is given for *Lycaon* and *Herse*, as it was not known by Kirby what part of the world they came from. Since the time of Fabricius, 1793, these drawings had never been fixed on any living species.

In 1872, 39 years after Boisduval and LeConte had figured *Celtis* and *Clyton*, during all which period their names had stood unchallenged, Mr. Scudder, in his Systematic Revision, first connects Jones's figures with our N. Am. species, making *Clyton* to be identical with *Herse* and *Celtis* with *Lycaon*, differing completely, as is seen from both Butler and Kirby. They regarded these drawings as meant to illustrate two sexes of one species, but that one neither *Clyton* nor *Celtis*. Mr. Scudder asserts them to illustrate two distinct species, with no explanation allotting one to *Clyton*, the other to *Celtis*. Now *Clyton* and *Celtis* belong to two well marked sub-groups, and it shows the utterly worthless character of the Jones drawings for identification of species, that such an authority as Mr. Butler should regard them as representing the two sexes of one species, and that Mr. Scudder should, on the contrary, think they represented two species of distinct sub-groups.

In 1874, Mr. Riley, 6th Mo. Report, gave admirable wood-cuts—as his manner is—of both our species, but unfortunately, followed Mr. Scudder in perpetuating the errors I have spoken of, and that evidently out of deference to Mr. Scudder's supposed means of information. He says that “for forty years the species have been known as *Celtis* and *Clyton*, and he regrets that some time should not by agreement be fixed, say a quarter of a century, after which an insect which has been universally designated by a particular name, should not be called on to change its name evermore, no matter what prior name might turn up. But as no such rule exists, he thinks the quickest way to get rid of the confusion now attaching to the specific nomenclature is to follow Mr. Scudder, who has given the matter so much attention.” If I am not much mistaken, Mr. Riley would not give that advice to-day. I do not suppose Mr. Scudder ever saw *Celtis* and *Clyton* alive—as they are not New Englanders—and all that he knew of Jones' figures was learned by a cursory inspection of them at Oxford at some time during his travels. That unlucky inspection has been the cause of a great deal of trouble.

I had occasion to figure *Celtis* and *Clyton* in Vol. 2, But. N. A., Parts 3 and 5, and I obtained, by the kindness of Prof. Westwood, colored copies made by himself of both surfaces of *Herse*. Mr. Riley, after his

paper was written, had also obtained from the same source uncolored tracings of both *Herse* and *Lycaon*, which he permitted me to see. Mr. Butler had himself examined the drawings and wrote me, he still regarding them as representing two sexes of one species: "It is certainly not *Celtis*, which I know well." Now Mr. Butler's testimony was of itself sufficient to settle this matter.

I first saw the tracings spoken of through Mr. Riley, and in my Part 3, I say: "I entertain not a doubt that they were meant to represent *Idyja*, or a species allied to that." There are certain well marked peculiarities in the arrangement of the spots in *Idyja* to be found roughly done in the drawings, and herein *Idyja* differs from either of our two species. I copied Fabricius' description of *Lycaon* (drawn up from Jones), and compared it line for line with the appearance of *Celtis*, and made it plain that the description of one could not apply to, and could not have been meant for, the other, whether as to coloring or markings.

When I wrote the text of *Clyton*, Part 5, a year later, I had Prof. Westwood's colored copies of *Herse* before me, and I showed that Fabricius' description of *Herse* could not possibly relate to *Clyton*. I gave wood cuts of the under sides of *Herse* and *Idyja* (a West India species whose nearest allies are to be found in tropical America), and the resemblance in the arrangement of the spots between these two was as unmistakable as was the difference between either and *Clyton* or *Celtis*. If Jones did not have *Idyja* before him he certainly had a species of same sub-group. But what that species was it is impossible to say. Surely it is quite time that Fabricius' names for Jones' figures should drop into their original obscurity. Nevertheless here they stand in Mr. Scudder's "Butterflies," 1881, as if their claims were established, or had never been denied, and the names properly belonging to the species are put down as synonyms!

14. On *COLIAS CHRISTINA* Edw.

In Mr. Strecker's Catalogue, p. 81, *Colias Christina*, a well marked orange species, figured in Vol. 1, But. N. A., is set down as a var. of *C. Pelidne* Bd., a yellow species which I should say was at a considerable distance in a series; and in various other publications Mr. Strecker has expatiated on this supposed discovery. *Pelidne*, with its var. *Christina*, stands as No. 54 in his series. *Colias Occidentalis* Sc. is quite as strangely put down as a var. of *C. Philodice*, a species for which it has but a slight

affinity, and *Philodice* stands No. 58 in his series, *Alexandra*, *Emilia* and *Barbara* intervening between it and *Pelidne*. And *C. Scudderi* is given as a synonym of *Pelidne*, not even worthy to be called a variety.

Being recently in New York, I saw in the collection of Mr. Henry Edwards several examples of what Mr. Strecker had sent him as *Christina* from Hudson's Bay, where this complication of species is said to be the normal condition. These examples embraced ♀ *Scudderi*, ♂ ♀ *Occidentalis*, and no *Christina* at all!

While on this subject, I may as well add that *C. Barbara*, H. Edw., spoken of above, stands as a good species in Strecker's Cat., No. 57, and *C. Harfordii*, H. Edw., is put as a var. of *C. Chrysothème*, No. 60, although the latter is not an American species. It is however an orange species, whereas *Harfordii* is a yellow one, and *Harfordii* and *Barbara* are really one and the same thing. Mr. H. Edwards suggested this in a paper in Proc. Cal. Acad. Sci., 17th June, 1878, and he informs me that he is at present fully satisfied of the identity. After inspection of the specimens in his collection I agree with him.

MIGRATION OF DRAGON-FLIES—*Aeschna heros** (Fabr.)

BY A. H. MUNDT, FAIRBURY, ILL., LIVINGSTON CO

On the evening of August 13th, 1881, I observed them between the hours of 5 and 7 o'clock. The air for miles around seemed literally alive with these dragon-flies, from a foot above ground to as far as the eye could reach, all flying in the same direction, a south-westerly course, and the few that would occasionally cross the track of the majority could all the more easily be noticed from the very regular and swift course they generally pursued; but even these few stray ones would soon fall in with the rest again. Very few were seen alighting, and all carefully avoided any movable obstacles.

The next day very few were seen on the prairies, and these mostly of another species very abundant in this country, *Anax junius* (Drury), which were probably at home previously, and in a few days I could see none others but the latter. A few newspapers, and also a few correspond-

* } *Aeschna heros*, Fabr.
 { *Aeschna*.

ents from twelve to fifteen miles east and west of here, had observed and mentioned their flight. Although their course was precisely in that direction, Prof. Forbes, of the State Normal Museum, writes that "no observations had been made there regarding the migrating of this insect," and he kindly identified the last named species for me ; however both have been carefully looked up and identified as being separate, by other well informed Entomologists, all agreeing with me that the above names are correct.

Whether their migrating was instinctive, or forced by the Manitoba wave, then reported in Chicago papers as having arrived in that direction, after a spell of very warm weather ; or caused by the dry season, the ponds having become so exhausted as to afford no pasturage for their larvæ, seems a matter of conjecture ; most likely the latter, however, as the cold wave reached here but very slightly.

NOTES ON LAST YEAR'S COLLECTING.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

No one I think can have been long engaged in collecting insects without having noticed the remarkable diversity in the products of different years, not only in quantity, but in kinds. Each summer seems to bring its own particular species to the front, so that if a person wishes to get a moderately correct idea of the insects of any locality, it is necessary for him not only to hunt diligently all the season, but every season for a considerable length of time ; and if he has from any cause missed one, he may be sure he has missed something which it may be years before he will again have an opportunity of securing, or securing in the same abundance. The causes of these variations seem as yet to a great extent a mystery.

Insect hunting could not be said to be good in this locality last summer. It might be considered very poor, yet it produced its new things for the collection, and some things in plenty which had hitherto been scarce. On the 12th of May I came across some specimens of a *Pieris* which I thought were poor specimens of *oleracea*, but which Mr. Edwards determined to be *Virginensis*. On the 23rd I took a very attractive *Chrysomela*, which is in the Society's Coll. in London as *C. labyrinthica*, but which the authorities say is *multiguttis* of Crotch's Check List, of which

scalaris is a synonym. Rather remarkable, surely, that so handsome and distinctly marked an insect should not have a name of its own. Its season lasted about four weeks, during which I secured over a dozen. I took one specimen of *Stenosphenus notatus* Oliv. Of this species I captured in May, 1879, three specimens, the first I ever took, and that year, a week or two previous to my captures, I received from Mr. Reinecke, of Buffalo, a pair labelled Dallas, Texas. They are exactly similar. The Cerambycidae were ten days later than usual this year. *Goes debilis* was numerous, and I took my first and only specimen of *S. pulcher*. *Saperda discoidea*, although never plentiful, is interesting from the great difference in size and markings of the sexes. I had always found two or three females to one male until last season, when the males were most numerous. There were several species of *Leptura* quite common, especially *vibex*, which I had not seen before. *Gaurotes cyanipennis* was in great abundance, but although you could bring a dozen down with one stroke, you might not secure more than two or three, they were so quickly on the wing again. The months of July and August were barren of anything worthy of note. In the second week of September the fall moths began to appear, and up to the end of October were quite plentiful. Those attractive genera, *Scopelosoma* and *Lithophane*, were more fully represented than I had seen them since the fall of 1877, when I took eight or ten species for the first time. A few *S. Graefiana* and *L. Bethunei* can be found every year, but *Scopelosoma Pettiti* and *ceromatica*, and *Lithophane semiusta*, *pexata*, *signosa*, *petulca*, *querquera*, are rare. Some of these choicer species were easily secured again last fall. I also took one new to me, *L. ferrealis*, whilst a friend here, Mr. J. Johnston, took *S. tristigmata* and *L. cinerosa*, which we were enabled to identify through the kindness of Mr. R. Thaxter, of Cambridge, Mass. Mr. Kyle, of Dundas, secured *L. Georgii*, which I have not yet met with. It may be worthy of note that Mr. Johnston took a specimen each of *Plusia striatella* and *Charocampa tersa*, the first taken here of either species.

Mr. Thaxter kindly determined the following for me :

Dryopteris rosea,	Hadena Miselioides, .
Limacodes inornata,	Dianthoecia meditata,
Gortyna cerina,	Orthodes cynica,
Calledapteryx dryopterata,	Paristichtis perbellis,
Mamestra eloniplina.	

The last four were taken the previous year at Long Point.

CATOCALÆ TAKEN IN THE VICINITY OF FRANKFORD,
PENNSYLVANIA.

BY JAMES S. JOHNSON.

NAME.	OCCUR- RENCE.	CAPTURES.	EARLIEST CAPTURE.	LATEST CAPTURE.	DURATION, DAYS.	FOUND ON
Epione.	Not common.	Every season.	July 10, 1880.	July 28, 1881.	19	Oak and chestnut.
Lachrymosa.	Rare.	3 specimens.	Sept. 4, 1877.	Sept. 7, 1881.	4	Oak.
Obscura.	Not common.	Every season.	July 10, 1880.	Sept. 27, 1881.	18	Hickory and oak.
Angusii.	Rare.	5 specimens.	Sept. 3, 1880.	Sept. 7, 1881.	5	White and black oak.
Var. Lucetta	Rare.	3 specimens.	Sept. 3, 1880.	Sept. 8, 1877.	6	" "
Ualume.	Rare.	1 specimen.		Sept. 27, 1881.		Black oak.
Insolabilis.	Not common.	Every season.	July 8, 1880.	Sept. 8, 1881.	63	Hickory and oak.
Robinsonii.	Not common.	Every season.	Aug. 10, 1880.	Sept. 27, 1881.	49	" "
Viduata.	Very rare.	2 specimens.	Sept. 5, 1877.	Sept. 7, 1881.	3	Black oak and elm.
Retecta.	Not common.	Every season.	July 19, 1880.	Sept. 10, 1881.	54	Oak, hickory & chestn't
Flebilis.	Not common.	Every season.	July 26, 1877.	Sept. 27, 1881.	64	" " "
Desperata	Common.	Every season.	Aug. 9, 1877.	Sept. 19, 1881.	42	" " "
Tristis.	Rare.	5 specimens.	July 14, 1877.	July 21, 1877.	8	Tulip, poplar and oak.
Judith. }	Rare.	Every season.	July 9, 1880.	Aug. 23, 1881.	46	Shell-bark hickory.
Levetii. }						
Cara.	Not common.	Every season.	Aug. 6, 1880.	Sept. 13, 1880.	39	Oak and old stumps.
Amatrix.	Common.	Every season.	Aug. 9, 1880.	Oct. 10, 1877.	63	Beech, maple & willow
Var. Nurus.	Common.	Every season.	Aug. 17, 1880.	Oct. 10, 1877.	55	" " "
Cociunati.	Very rare.	3 specimens.	July 14, 1880.	July 23, 1877.	10	Beech.
Unijuga.	Not common.	Every season.	Aug. 28, 1881.	Sept. 21, 1877.	25	Beech and willow.
Marmorata.	Very rare.	1 specimen.		Sept. 6, 1881.		White oak.
Parta.	Not common.	Every season.	July 21, 1877.	Oct. 10, 1877.	82	Beech, oak and willow.
Ultronia.	Not common.	Every season.	July 8, 1880.	Aug. 23, 1881.	47	" " chestnut.
Concumbens.	Very rare.	1 specimen.		Aug. 16, 1877.		Beech.
Ilia.	Common.	Every season.	July 1, 1880.	Sept. 10, 1881.	72	"
Innubens.	Rare.	7 specimens.	Aug. 10, 1877.	Aug. 31, 1877.	22	" and chestnut.
Var. Scintillans.	Very rare.	2 specimens.	Aug. 18, 1877.	Aug. 29, 1877.	12	" "
Piatrix.	Not common.	Every season.	Aug. 10, 1877.	Sept. 6, 1881.	28	Walnut and oak.
Subnata.	Rare.	Every season.	July 14, 1880.	Aug. 22, 1881.	40	Beech.
Neogama.	Common.	Every season.	July 10, 1880.	Sept. 27, 1881.	80	" and oak.
Paleogama.	Common.	Every season.	July 11, 1880.	Sept. 19, 1881.	71	" "
Var. Phalanga	Rare.	Every season.	July 16, 1880.	Sept. 8, 1881.	55	" "
Nebulosa.	Very rare.	4 specimens.	July 26, 1877.	Sept. 27, 1881.	64	" "
Serena.	Not common.	Every season.	July 11, 1880.	Sept. 8, 1881.	60	Shell-bark hickory.
Habilis.	Common.	Every season.	July 25, 1880.	Sept. 27, 1881.	65	Oak, hickory & chestn't
Cerogama.	Not common.	Every season.	Aug. 8, 1880.	Aug. 27, 1881.	20	Oak and beech.
Antinympha.	Rare.	Every season.	Aug. 15, 1877.	Aug. 23, 1880.	9	Under brush and logs.
Grynea.	Not common.	Every season.	July 1, 1880.	July 24, 1881.	24	Oak and hickory.
Gracilis.	Not common.	Every season.	July 9, 1880.	July 29, 1877.	21	Oak.
Var. Similis.	Not common.	Every season.	July 10, 1880.	July 27, 1881.	18	"
Minuta.	Rare.	4 specimens.	July 21, 1877.	July 28, 1881.	8	"
Linella.	Common.	Every season.	July 4, 1880.	Sept. 1, 1881.	60	Black oak.
Androphila.	Common.	Every season.	July 14, 1880.	Sept. 8, 1881.	57	White oak.
Amasia.	Very rare.	3 specimens.	July 24, 1877.	Aug. 6, 1877.	14	"

The above table was compiled from my diary for the past five years. I notice that the season of 1880 was 8 or 10 days in advance of the others, while 1877, during which there was a harvest, held out the longest. All of the specimens were taken at rest, and the trees named are those on which they were discovered and seemed to select for hiding. It is a singular fact that among the hundreds I have captured, I have never yet found a ♀ *Catocala* containing eggs.

CORRESPONDENCE.

A CORRECTION.

DEAR SIR,—

In my article which appeared on pages 21–23 of the CANADIAN ENTOMOLOGIST, Vol. xiii, No. 2, the species was erroneously accredited to *Plusia precatioris* Gueneé, instead of to *Plusia simplex* of the same author. This mistake on my part was owing to the fact that the moths from which I obtained the eggs had the metallic spots in the centre of the fore wings nearly as they are in a *precatioris* which Mr. Grote determined for me. I have been enabled the present season to correct my former mistake by the use of the excellent descriptions of the *Plusia* moths given by Prof. Cyrus Thomas in his Fourth Report.

On the 21st of November, 1881, I received from the Editor of the Germantown *Telegraph* a box of insects for determination, and in the letter which accompanied the box the Editor stated that the worms which he sent me were very destructive to the celery in many gardens in his locality.

These celery worms agreed precisely with the description of the *simplex* larvæ referred to above. They differ from the larvæ of *brassica*, as given by Prof. Riley, only in having the spiracles ringed with black; and both of these larvæ differ from that of *precatioris* by not having a black stripe on each side of the head. In all other respects these three larvæ appear to be utterly indistinguishable.

D. W. COQUILLET, Woodstock, Ill.

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No. 4

NOTES ON PEMPHIGUS TESSELATA, FITCH.

BY HERBERT OSBORN, AMES, IOWA.

SYNONOMY.

Chermes alni Kalm. Travels into North America, English translation, vol. 1, p. 154; p. 121, 2nd ed.

Eriosoma tessellata Fitch. 4th Report State Cab. Nat. Hist., N. Y.

Eriosoma tessellata Glover. Ag. Rept., 1876, p. 39.

Eriosoma tessellata (or *imbricata*) Glover, unpublished plates HOMOPTERA iii., fig. 19.

Schizoneura tessellata Thomas, 8th Report Insects of Illinois, p. 139.

Apparently the first record of this insect is given by Kalm., as cited above, where he says under date of Oct. 3rd, 1748: "I saw to-day the *Chermes* of the Alder (*Chermes alni*) in great abundance on the branches of that tree, which for that reason looks quite white, and at a distance appears as it were covered with mold." This reference, in all probability, is to *P. tessellata*, and the reference to the European species, *Chermes alni* L., a mistake, since there are no later records of the European species being found here, and this one is specifically distinct from the one described by Linnæus.

Dr. Fitch describes the apterous female and states that he had searched in vain for winged individuals. His specimens were from *Alnus rubra*. Mr. Glover states that it was found upon Birch in Maryland. In his unpublished plates he figures the same, referring to it as *tessellata* or *imbricata*.

The newly-born larva is pale brown. The antennæ are 4-jointed, the first joint short, second one-half longer, third and terminal nearly equal and each equalling the first and second together. The dorsal portion of the body is covered with slight elevations which mark the position of the wax-secreting glands. They are arranged in rows, there being three rows on each side in the abdominal segments, except the terminal, which has

none, and the subterminal, which has two on each side. On the thorax and head they are smaller and fewer in number. Length of body 1.25 m. m.

Apterous viviparous ♀. "Dull bluish black; tergum with the segments marked by strongly impressed lines and covered by white down in square checker-like spots. Length 0.16 in." (4 m.m.) Fitch.

The abdomen is covered by long shreds of down, while the thorax and head are simply covered with whitish dust. Antennæ 5-jointed by division of third (?) joint of larval antenna into *two*, while the second joint has apparently shortened.

Fresh specimens of winged ♀ cleaned in alcohol are described in MS. by Dr. Hagen as "head and antennæ black, prothorax pale dirty whitish; thorax chestnut brown; abdomen pale whitish gray, above with six rows of blackish spots; beneath with four blackish fine lines on each side near the middle, not reaching the tip; legs brown; tibiæ and tarsi paler; wings opaque, veins pale, except the mediana of fore wings, which is brown. Full grown nympha is similar to the imago; the wing coverings are black."

Alcoholic specimens of winged viviparous ♀ were dark bluish black with the white filaments on the abdomen less prominent than in the apterous ♀; head and thorax covered with whitish powder. The antennæ are 6-jointed by division of the third (?) larval joint into *three*, the second joint shortening; joints 3-6 are marked with transverse irregular interruptions lined with a thin membrane, while the terminal and subterminal joints contain sensitive glands, as do also these joints in the larva and apterous ♀. Length 4-5 m.m. Expanse 10-12 m.m.

The sensitive glands of the antennæ, which may be seen in the terminal and subterminal joints, are cavities or funnel-shaped openings in the crust, which are lined by a membrane which expands in the middle into a glandular body from which arise from two to four papillæ. In some cases within the border of the cavity can be seen minute ciliæ forming a fine fringe. These organs undergo but little modification during the metamorphoses of the insect. They are prominent in the embryo taken from the viviparous female. In the adult, however, they are partially obscured by other irregularities in the surface. In the winged individuals, where the antennæ are 6-jointed, the terminal joint has at tip five short papilla-like spines, and a little below these four slightly granular elevations, immediately beneath which is an interrupted space in the

crust, and at one side of this a cavity containing a papilla ; the surface of the joint is broken below this in two places by irregular interruptions in the crust, which appear to be lined by more delicate membrane. It is also somewhat roughened and thrown up in places in transverse ridges or elevations ; a few hairs also pass from round openings in the crust. The subterminal joint has very near the end a large opening through the external coat, and within this three large glandular bodies which bear papillæ. Other open spaces are to be seen along the joint, but no glands. The fourth and third joints have also irregular transverse interruptions in the crust, but no papilla-bearing glands.

The papilla-bearing bodies in the last two joints must certainly be organs of sense, though I have not been able to satisfactorily show their connection with nerves. A delicate thread, probably a nerve, can in some cases be seen running through the joints, but preparations from fresh specimens will be necessary to establish its character and connections. The delicate membranous coverings of the transverse irrorations in the crust seem also well adapted to receiving impressions, but their connection with nerves is still undetermined.

The labrum is a slender conical projection beyond the clypeus from which its separation is indistinctly marked, since it contains but little chitinous structure. It is channelled on the under side to near the tip, and from this channel the setæ forming the sucking tube pass in a regular curve into the channel of the labium.

The superior setæ (mandibulæ) spring from cones which originate with chitinous arcs each side of the opening of the œsophagus ; passing forward, they unite immediately in front of the hypopharynx and within the paraglossæ. The inferior setæ (maxillæ) arise from similar cones which lie beneath based upon chitinous structure lying at the superior posterior portion of paraglossal bases. They unite with each other and with the superior setæ at the union of the latter, and pass with these between and in the channel of the paraglossæ, and thence into the groove of the labrum. The paraglossæ are short and setaceous, arising from an inferior lamina which rests upon the base of the labium. The labium is *4-jointed* and reaches nearly to the end of the body in the larva, but only beyond the first pair of legs in the adult ; the tip is surrounded by numerous hairs and a row of bristles extends each side of the groove. Immediately in front of the œsophageal opening appears a denser portion, the epi- and hypo-pharynx, extending to the union of the setæ, and within

this, forming a central row, are eight spots, light in the centre with dark borders, becoming entirely dark with more superficial focussing; apparently these lie immediately above the channel formed by the epi- and hypo-pharynx leading to the gullet.

In *Cicada* the epi-pharynx, which forms the under surface of the clypeus, is channelled, and the edges of channel are raised into two strong arches. In the central portion of this channel is a double row of ten spots similar to those described in *P. tessellata*, and back of these in a direct line toward the pharynx is a sac-like organ apparently with an opening into the channel and with a delicate tube leading from its neck, and within its boundaries two clusters containing four spots each, lying one on each side of the median line.* These spots are very similar to structures that I have examined which are similarly located in the honey ant, and which evidently correspond with the sense organs of the honey bee described as located here.

These organs, which seem never to have been described in Hemiptera heretofore, are present in such Hemiptera as I have been able to examine, and when fresh specimens are at hand, it is hoped that their structure and office may be more fully determined. It seems most probable, however, that they are organs of sense, and their location would warrant the belief that they may be connected with taste, though they may be connected with smell instead, or it is not impossible, owing to the close relation of these senses even in the highest animals, that they might perform a double office. The wax-secreting glands located on the dorsal surface of each segment consist of circular groups of large pavement cells disposed beneath the epidermis.

Prof. Thomas, in his work on Aphididæ (8th Rept. State Entomologist of Ill.), places this species in the genus *Schizoneura*, but following the venation of the wings according to which the genera are divided, it cannot be placed in this genus since the third discoidal vein is not forked, while in other characters, as well as this, it agrees with *Pemphigus*.

The venation, however, is not constant, for in examining the wings of over thirty specimens, one was found in which the third discoidal of the front wing was distinctly forked, while in one other the second oblique of the hind wing was forked.

* Can this structure be analogous to the "taste goblets" which are found in the fungiform and circumvallate papillæ of the human tongue?

The hooklet which attaches the hind wing to the front one is composed of five pieces side by side, like the fingers of a hand. It fits into a fold of the hind border of the front wing, which lies at the termination of the first discoidal vein.

The observations here recorded were made during the past winter in the Cambridge Museum of Comparative Zoology, while studying under the direction of Dr. H. A. Hagen, to whom I am under lasting obligations for valuable aid and for the use of material and books with which to pursue my work.

REMARKS ON THE GENERIC CHARACTERS OF THE NOCTUIDÆ.

BY JOHN B. SMITH, NEW YORK.

"I can get along very well with the Butterflies, and I know something about Beetles, but the *Noctuidæ* were always a great puzzle to me." So writes one of my correspondents, and to the same effect are expressions, both oral and written, from nearly all the collectors I have had any acquaintance with. And yet there is no good reason why the *Noctuidæ* more than the other families or groups should be considered so very difficult. True that the species are often very closely allied, and true also that there is often more difference between variations of one species than there is between valid (so considered at present) species. Yet there are many excellent characters in the *Noctuidæ*, easily recognized and readily discerned, which make the placing an unknown species into its proper genus a task of little difficulty.

The truth is that the *Noctuidæ* are not so difficult a group *per se*, but the sources of information concerning it are so various, so difficult of access, and so foggy when they have been discovered, that even if the student happens to know the language in which his work is written, the information derived scarce repays the trouble bestowed upon the search. Later writers have done little to lift the veil which concealed knowledge from the eyes of others. Species there have been described in very large numbers, and genera have been created with exceeding great liberality, and the result is that the beginner is appalled at the chaos which confronts him in Entomology, and takes to Botany or some other branch of natural

science about which something seems to be known. Many of the writers of the present decade also seem to find their greatest delight in accusing those whose misfortune it is not to agree with them, of ignorance, either of the literature of the subject, or of anatomy, or something else equally heinous. A knowledge of the literature of the subject is, I admit, an accomplishment not everyone can boast of, but a knowledge of the anatomy of a Noctuid is a thing that any one can acquire in a very short time. All this has nothing particular to do with generic characters, but it was necessary to say a few words to explain why the following dissertation was written, and I will now proceed with my subject.

A good, concise definition of the group *Noctuidæ*, which shall include all the forms belonging to it, and exclude everything not so referable, is still one of the *desiderata*, and I am not able at present to supply it. As good a one as it is possible to get within a short space is the following from the preface of my synopsis of the genera :

The Noctuidæ are as a rule robust, seldom slightly built moths, with comparatively small, stiff wings, which, except in *Tortricodes bifidalis*, are entire ; the ocelli are nearly always present, and the wings have simple discal cells, two free veins at inner margin of secondaries (counted as one by the German Entomologists), and one at inner margin of primaries; the latter usually have also an accessory cell at the upper angle of the discal, sometimes separated from it by a short stalk. The antennæ are bristle-form, generally simple in the female and pectinate or ciliate in the male.

Commencing at the head, the characters used in generic divisions are as follows :

The *eyes*, as to clothing, are either entirely naked, naked and fringed above and below, and sometimes at the sides, with hairy or bristly lashes, or entirely hairy—a single hair usually arising from the angles of the facets of the compound eye. These differences have a very great generic value, and two genera separated only by one or the other of these characters would be valid.

In form the eyes are either hemispherical and very strongly convex, rounded and somewhat flattened, elongate oval, or reniform. The degree of convexity or the size have no, or only a slight, generic value, but an insect with reniform eyes would be generically distinct from a round-eyed one.

The *ocelli* are usually present, but are lacking in a few genera ; in this group lack of ocelli suffices for generic separation. When present they

are found close to the compound eye, and behind the base of the antenna. Usually they can be distinguished without denuding the head, but occasionally they are so small, and the vestiture of the head is so thick, that a part of it must be removed before the presence of the ocelli can be positively determined.

The *clypeus* is variously modified; usually it is smooth, moderately convex, and without any special peculiarity. In some cases, however, it becomes prominent, bulging out between the palpi, and this convexity has occasionally a concave depression in front, and in this depression again are tubercles, conic protuberances, etc. In other genera a conic tubercle adorns the clypeus; sometimes there is a cylindrical projection, and sometimes the projection is flattened; in one genus (*Nonagris*) bifid in front. Occasionally the "infra clypeal plate" is produced, forming a flattened shelf-like projection, usually squarely cut off before. These projections are often partially or entirely concealed by the vestiture, but can in all cases be readily demonstrated by touch with a fine pin. As to the generic value of these modifications, there is considerable difference of opinion. For my own part, I consider them as having only a slight value, and as not being sufficient in themselves to separate genera. The genus *Cucullia*, for instance, has in some species a normal clypeus, in others a convex projection, and in others a depression in this convexity. *Arzama* has in some species a conic tubercle, which is lacking in others; so that genera distinguished by clypeal differences only should be cautiously created, and no genus based on the presence, absence or form of a tubercle situated in a depression of the clypeus, should have any standing.

The *tongue* varies somewhat in consistency and length. Sometimes it is almost obsolete, as in *Cleoceris* and *Euthisanotia*, but usually it is long, strong and corneous, coiled between the palpi. Genera may be properly based on the extremes of length and consistency of the tongue, but mere variations in length do not authorize them.

The *palpi* vary greatly, and genera are very largely based on their modifications. In the typical *Noctuae* they are of moderate length, the second joint generally longest and always heaviest, and the third joint usually small and slender, and sometimes so small as to be obsolete. They are usually curved upward, closely applied to the head, and generally reach to the vertex. Sometimes they are so short as to be practically obsolete, and then again they exceed the head by half the length of the entire insect (§ *Deltoidea*). Sometimes they are porrect and closely scaled,

having the terminal joint nearly as long as the second (*Catocala*). Sometimes, as in *Plusiodonta* and in some species of *Plusia*, the terminal joint is exaggerated, reaching far above the head. In some genera they are oblique and heavily fringed beneath, broadening toward the tip (*Basilodes*); then again they project forward horizontally, sometimes, in conjunction with the pointed frontal tuft, forming a snout (*Scolecocampa*). In *Hermia*, *Hyppena* and some others, the second joint is disproportionately long and fringed above with upright scales or hair, while the terminal joint is short and slender. Sometimes they are curved upward, sickle-shaped, nearly reaching the base of the thorax and closely scaled. Mere differences in the length of the palpi or in the proportions that their joints bear to each other, do not authorize generic distinctions, if the general form remain the same; but insects having the palpi practically obsolete could not be considered congeneric with those having them well developed; nor could an insect with porrect palpi be placed with one having elongate horizontal palpi; and this in turn could not be united with one in which they were sickle-shaped and curved upward. Variations in the position of the terminal joint, whether vertical, drooping or otherwise, do not authorize a generic distinction.

The *antennæ* are very variable, but their variations do not afford good generic characters, as they are generally sexual. Usually they are simple in the ♀ and more or less pectinate or ciliate in the ♂; sometimes they are both simple, and then again both sexes have them pectinated. In some of the lower forms the males have them bunched or knotted at or below the middle, sometimes there is a tuft of hair at this point, and sometimes alone, or in addition to either or both of these distinctions, there is a decided bend, usually above the middle. Sexual characters alone should not authorize genera, and therefore the variations of the *antennæ* should not have a generic value.

The *clothing* of the head varies with the clothing of the entire insect, but it is sometimes modified into tufts. There is occasionally a small tuft at the base of the *antennæ*, and often one in front, between the palpi. Sometimes the clothing of the front is smooth and even; then again it is rough, divergent, occasionally mixed with bristles. None of these modifications alone have a generic value, but they add to the value of others, and combined with them, may attain a greater value.

The *size* of the head as a whole, varies somewhat in the sexes, and does not alone afford good generic characters, but combined with the

mode of its attachment to the thorax, it attains a higher value. The head is sometimes free, separated from the thorax by a distinct constriction, and sometimes it is closely applied to it and almost buried in its vestiture. This about exhausts the head, and it will be seen that by the variations of the head and its appendages alone, numerous divisions and subdivisions can be established, which will simplify the determination of unknown species.

The *thorax* and its appendages vary less, but even here there is a great deal of difference.

In *shape* it is usually convex, sometimes very large and heavy, rarely small; often it is somewhat depressed and occasionally quite flat; sometimes it is quadrate, but more usually rounded or ovate. Alone these variations do not present good generic characters, but combined with tuftings and the proportion the thorax as a whole bears to other parts, they afford good distinguishing features.

The *vestiture* is usually hairy, often scaly, and sometimes a mixture of both. The extremes would be generically distinct, but where the vestiture is mixed, the question is not free from doubt; ordinarily an insect with mixed vestiture would be distinct from either a hairy or a scaly one, but sometimes the mixture is so slight, or the hairy insect has the hair so much flattened, that a generic separation would be unjustifiable. *Acronycta* and *Hadena* each fall into two very well marked divisions by the character of the vestiture.

The *tuftings* vary considerably. Sometimes there are none, sometimes there is only a small acute tuft behind the collar, sometimes a divided crest or tuft in the same place, and again there may be a rounded or truncate bunch of hair. Posteriorly there is usually a larger rounded tuft, but sometimes, as in *Plusia*, it rises upward saddle-shaped, or as in *Zale* and *Homoptera*, it is divided into three diverging tufts truncate behind.

The *collar* is sometimes produced at the middle, and excavated at either side, sometimes flat, disk-like, or again, as in *Cucullia*, hood-like and exaggerated.

These modifications of tufting and collar have but a small generic value. The presence or absence of either, or the variations in form, would not indicate a generic difference, though a total absence of tufts would probably do so if there were no intermediate forms.

The *tibia* are sometimes spinose and sometimes not. This affords an

absolute generic distinction. Sometimes all the tibia are spinulated, sometimes middle and hind tibia only, and sometimes only the middle tibia; the number of tibia spinulated has no generic value. The posterior tibia has usually (if not, as I believe, always) two pairs of spurs, one pair near the middle and the other at the tip. The middle tibia have a single pair at the tip.

The anterior tibia varies greatly in shape and armature, and its modifications afford good generic characters. Usually it is proportionate, and unarmed at tip; sometimes it has spinules at the extremity, and sometimes a single strong claw; sometimes the spines and claw co-exist. Neither of these alone authorize generic distinction. Sometimes the tibia is very short, exceeded in length by the first tarsal joint and variously armed at the tip; this suffices for generic distinction irrespective of the armature. This latter is various, sometimes consisting of spines and sometimes of claws at the tip. Very often the tibia, besides being shortened, is also flattened and becomes broader anteriorly; this also authorizes separation from a genus with the fore tibia equal, no matter what its length. In a few genera the anterior tibia is almost fossorial; *Tricopis*, for instance, having a very heavy, long inner claw, and three shorter but equally heavy claws outwardly. *Tamila* has very heavily armed tibia, and in *Heliolonche* the inner claw is nearly as long as the tibia itself, and not much more slender than the tarsi. The variations in the number of claws or their length alone, do not authorize generic separation, but added to a change in the form or proportion of the tibia, they would.

The males sometimes have a brush of long hair at the inner side of the anterior tibia, but this has no generic value.

The femora vary little, and so far as I know, not at all in the American forms; in the European forms two genera have them clavate. Such a modification would support a genus.

The tarsi, so far as I know, are always spinulated. They are sometimes distinguished by long fluffy hair on the anterior and middle pair (*Eriopus*), or by long, dense, vertical, upright hair on the posterior (*Remigia*). These modifications being sexual purely, have no generic value.

The wings vary greatly in form and proportion. Usually the primaries are elongate, widening gradually outwardly, with rectangular or obtuse apex, slightly oblique outer margin, rounded hind angle and straight inner

margin. The secondaries are usually more or less rounded, shorter and broader than the primaries.

This is their form in the typical *Noctua*, but variations from it are numerous ; sometimes the wings are short and broad, again they are narrow and equal, sometimes lanceolate, and occasionally falcate. In one species only the primaries are divided to the middle, and this is the lowest of our Noctuids, if indeed it belongs to the group. Some genera have a tooth at the hind angle of primaries, some a slight projecting lappet, and others have this angle either rounded or excavated. Little generic value can be given to these variations, as in *Plusia* all forms of wings can be found. A lanceolate primary would however indicate a distinct genus, and the same can be said of a decidedly angulated or falcate one. A broad lappet at the middle of the hind margin would indicate a distinct genus, but a merely sinuate hind margin would not. The proportion that the wings bear to each other and to the body, have a high generic value, and genera can be safely rested on that point ; be it understood, however, that I do not mean by this that every difference in that respect authorizes a genus. The proportion must be one striking the eye at first sight, and not to be only discoverable by careful measurement.

The *venation* of the wings among the *Noctuids* varies very slightly, and the variations have been very generally considered as having an absolute generic value.

The *abdomen* varies somewhat in shape and proportion, and also in the tuftings. As to shape, it is usually more or less cylindrical, generally reaching to and often exceeding the hind angle of the secondaries ; sometimes it is cylindro-conic, as in most *Catocala*, and sometimes it is flattened, as in *Scopelosoma* and some species of *Orrhodia* (*Glaea*). Its variations of form do not afford good generic characters, nor does its length, unless the proportion is exaggerated.

The *genitalia* of the males vary somewhat, but these variations, while affording excellent specific characteristics, have no generic value. First, because they are sexual merely ; second, because there is an insensible gradation from one into the other, rendering separation impracticable ; and third, because occasionally insects otherwise very closely related, differ very widely in this particular.

As to tuftings, these vary little in shape, being usually round bunches of vertical hair or scales, varying in number and size. Their presence or absence has no generic value, but affords good specific characters.

The foregoing includes most of the structural peculiarities of the group *Noctuidæ*, and it will be seen that there is nothing whatever in them that a student moderately familiar with the names of the parts of an insect, can not himself examine with but little trouble, and nothing requiring any higher magnifying power than that afforded by a good Stanhope lens.

PSEPHENUS LECONTEI.

BY J. GEO. GEHRING, CLEVELAND, O.

A few notes as to the habits and whereabouts of this inhabitant of the rapids of Niagara may perhaps be of interest to such collectors as may visit this locality the coming season. This interesting beetle being but rarely represented in collections, I felt induced to make extra exertions during a few hours sojourn there last August, to find it, and was finally rewarded by finding it in numbers. Although my time did not allow me to reap the benefit of my discovery, still if others are enabled to profit by these notes, the result will be the same.

By turning over the small rocks which lie in the small rapids close by the Goat and Sister Islands, the flat, crustacean-like larvæ will be found in great numbers adhering tightly to the under surface in all stages of development, and it is here one would naturally look for the perfect insect, but only to be disappointed. I spent nearly all of my time in this fruitless search, finding only *one* specimen on the under side of one of the stones, which proved to be a gravid female, and had well nigh given up in despair, when the sudden appearance and immediate disappearance of several small, shining beetles on the wet surface of a partly projecting stone aroused my attention. Every alternate wave would submerge the stone, when the objects of my anxiety would take flight, only to alight the next moment when the water retreated. After a deal of maneuvering, I succeeded in getting one, but to find that in my anxiety to get it I had crushed it hopelessly, but not so much as to prevent me from recognizing *Psephenus Lecontei*. The truth now dawned upon me that the place to look for *Psephenus* was not *under* but *outside* of the water, and accordingly I closely scanned the neighboring projecting stones. I soon found

the objects of my search to be perfectly at home on these projecting rocks, which were momentarily submerged by the waves, taking seemingly special delight in frequenting rocks where the current was most rapid and the swirl of the waters the strongest. It is a very active insect, and considerable dexterity is needed to take it without mutilating, the moment it alights on the slippery stones.

It would seem that it leads its matured existence entirely on the outside of the water and in the sunlight, the female only entering it for the purpose of depositing her eggs on the under side of the stones.

I am confident that any collector will be well rewarded for his trouble if he will follow the above suggestions in looking for *Psephenus*.

LARVA AND PUPA OF PHEOSIA RIMOSA, PACK.

BY CHAS. F. GOODHUE, WEBSTER, N. H.

Mature larva, 1.50 to 1.75 long. The body increases in size from the head to the anal segment, deeply incised between the segments. Head small and nearly round; first four segments can be retracted nearly one-half. Head and entire upper parts of body pale slate color, slightly shaded with brown on the dorsal portion. Yellow beneath between the legs, also a slight stigmatal line of the same color. Caudal horn short and black; the black extends from the base of horn to below the stigmatae. Anal shield rusty and rough; stigmatae black, encircled with yellow; abdominal feet black, the rest pale yellowish. Another specimen differs in color, being pale lavender, a slightly darker dorsal line. Under parts between the legs, a faint substigmatal line greenish yellow. Another, slightly smaller, was of a bright pea green color, with a bright yellow stigmatal stripe, in other respects like the former. The larvae are very much like those of the Sphingidae in appearance, and are exceedingly smooth and shiny. Found on willows and poplars, the last of Sept. The transformation takes place in a slight cocoon of dead leaves fastened together with a few silken threads, on the surface of the ground, much in the manner of *Darapsa myron*.

Pupa dark brown. Head case smooth, deeply incised between the abdominal segments. Anal segment large and smooth, ending in two

short points. The moth appears early in spring and is probably double brooded, as Mr. Fred. Tepper, in the Bulletin of the Brooklyn Ent. Soc., Vol. II., page 4, speaks of the moth in August.

ON CERTAIN FORMS OF NORTH AMERICAN NOCTUIDÆ,
INTERESTING FROM THE STRUCTURE OF
THE CLYPEUS AND TIBIÆ.

BY A. R. GROTE.

The following genera seem to fall in between *Heliothis* and *Plusia*. They appear to be distinctively American, and there is nothing like them in the European or Asiatic faunæ, so far as appears in literature. The white species inhabit the West and South-west; and the fore wings are remarkable for their lustre, the markings consisting often of black dots, in this recalling *Emydia* and certain Lithosians.

BESSULA Grote.

Vestiture hairy. Eyes naked. Front full, without excavation or tubercle, the infra-clypeal plate prominent. Tibiæ spinose, the fore tibiæ with a claw. Thorax untufted. Antennæ simple. Fore wings dull. Aspect of the Arctiid genus *Pareuchaetes*. One species from New Mexico, *Luxa*, Grote. Primaries very light and fady yellow. The t. p. line indicated by a curved series of faint ochrey dots. Two cellular dots and one or two more in place of t. a. line. Beneath costa and apices dusky yellowish. The coloring is very pale and the dotted markings tend to become lost. Consult: Papilio, I., 176.

ANTAPLAGA Grote.

Vestiture scaly. Eyes naked. Fore tibiæ with a stout claw. Front with a protuberance rising from the lower margin of a rim-like excavation jutting out from above the infra-clypeal plate. Primaries white, silky, shaded outwardly transversely with olivaceous fuscous, the dark ground color cut by the whitish subterminal line. In shape the fore wings widen outwardly, the apices are produced and the costal margin is long; the external margin very oblique and the internal margin comparatively short. One species from Colorado, *Dimidiata* Grote, Can. Ent., 9, 71.

PIPPONA Harvey.

Vestiture scaly. Eyes naked. Labial palpi short. Front full without excavation or tubercle. Thorax untufted. Cut of the wings somewhat like *Heliophila*. Fore wings satiny white, immaculate. Antennæ simple. All the tibiæ spinose; fore tibiæ strongly armed. One species, *Bimatrix* Harvey, from Texas, with yellowish head and abdomen; primaries with a faint yellowish costal tinge; shaded beneath with fuscous. There are probably no "claws" to the front tibiæ, only stout spines. Consult: Bull. B. S. N. S. III., 9.

EPINYCTIS Grote.

Vestiture scaly. Eyes naked. Labial palpi short. Front full, without excavation or tubercle; the infra-clypeal plate prominent. Tibiæ non-spinose; fore tibiæ short, with a claw. Thorax and abdomen untufted. Antennæ simple. Cut of the wings somewhat like *Cucullia*. Primaries narrow and long, apices pointed; external margin oblique, even; the wings satiny white. One species, *Notatella* n. s., size of *Bimatrix*, from Montana. Fore wings with two black dots on the cell. Below, on internal margin, about where the median lines might terminate, are two more. A row of black points along external margin. Else concolorous, immaculate white.

PLAGIOMIMICUS Grote.

Vestiture scaly. Eyes naked. Front with a cup-like excavation, the raised edges forming inferiorly a corneous projection above the infra-clypeal plate. Tibiæ unarmed; fore tibiæ with a claw. The tegulæ spreading away from the thorax behind with elevated terminal scales. Body untufted. One species, from New York to Texas, fuscous, with angulated pale lines and a dark sub-apical, costal triangulate patch, *Pityochromus*, Grote, Bull. B. S. N. S., I., 182.

POLENTA Morrison.

No characters are given by the author of this genus, excepting the negative one that it may be distinguished from *Schinia* by the "plain" fore tibiæ. I have shown, Bull. B. S. N. S., III., that the genus is not allied to *Schinia*, of which *trifascia* is the type; it differs throughout from that genus. It differs by having a frontal excavation, and it agrees with *Plagiomimicus* in this respect, as well as in the peculiar tegulæ and

especially in the pattern of ornamentation. *Polenta Tepperi* is a very pretty, delicate, dusky greenish species from the South, and its sole generic distinction from *Plagiomimicus*, the "plain" fore tibiae, wanting the claw, must be verified. The frontal excavation is slighter and its shape a little modified as compared with *Pityochromus*, but in their peculiar appearance the two insects are so similar that they would hardly be referred to different genera. It must be remembered that Mr. Morrison redescribes *Pityochromus* as *Schinia media*, and that it is with this species, which has a claw on the fore tibiae, that Mr. Morrison compares *Polenta*. The typical species of *Schinia*, *trifascia* and *rectifascia*, appear to me to have the fore tibiae unarmed.

STIRIA Grote.

Vestiture scaly. A moderate frontal excavation with a moderate tubercle near its inferior edge. Eyes naked. Legs unarmed, the fore tibiae with a stout blunt claw. The thorax is short with the extremity of the patagiae spreading and fringed with uplifted scales like *Plagiomimicus* and *Polenta*. Size large; fore wings broad with a *Plusia*-like tooth at internal angle. The species is rather light bright yellow, with frosted purple patches at base on internal margin and at the centre of the wing, while the terminal space and thorax are also of this darker shade. A showy species, *Rugifrons*, Grote, Bull. B. S. N. S., II., 73, from Illinois, Kansas and Colorado.

STIBADIUM Grote.

A curious moth, resembling the fuscous species of *Gortyna* in color (*necopina*, *nitela*), but slighter. The wings have not the fringed tooth at internal angle of primaries as in *Stiria*, but belonging here from the shallow excavation of the front, wanting, however, the tubercle, and the unarmed tibiae, the fore tibiae with a claw. The peculiar frosted coloring also allies the moth to *Stiria*. *Spumosum* Grote, Bull. B. S. N. S., II., 74, occurs in the same localities with *Rugifrons* and in two varieties, one paler, more ochrey than the typical form.

NEW OR LITTLE KNOWN GENERA OF NORTH AMERICAN
SYRPHIDÆ.

BY DR. S. W. WILLISTON, NEW HAVEN, CONN.

In the preparation of a synopsis of the North American genera of Syrphidæ, I have found several new species that could not be placed in any of our known genera. A careful study of the figures and descriptions of exotic forms has not thrown much light upon them, and I am therefore constrained to regard them as new.

With the genera included in the present paper, and resuscitating Macquart's *Toxomerus*, the number now recorded from North America will reach sixty, all but five or six of which are in the writer's collection. Of these, but nine or ten have not yet been found east of the Central Plains, and the following, only, that are not now known west of that region, viz., *Triglyphus*, *Senogaster*, *Pyrophaena*, *Doros*, *Ocyptamus*, *Rhingia*, *Brachypalpus*, *Somula*, *Temnostoma*, *Merapioidus*, *Pterallastis*, *Teuchocnemis* and *Lepidomyia*, leaving nearly forty genera that occur entirely across the continent; indeed a large proportion of the species are identical from the Atlantic and Pacific regions.

Merapioidus villosus Bigot, Bul. Soc. Ent. France, 1879, No. 6, p. 64. An aberrant and well marked genus, easily recognized by the peculiar structure of the antennæ, the third joint of which is extended on its upper anterior part into an elongate cone, slightly bent forward and terminating in the thickened arista. The arista is really subterminal, showing the development of such genera as *Callicera* and *Ceria*. Body short, oval, abdomen with interrupted metallic fasciæ. Its relationship is remote from *Milesia* in Schiner's acceptation (*Sphixea* Rond., Bigot.) viz., with the closed sub-marginal cell. It may be placed in the neighborhood of *Criorhina*, *Chrysochlamys*, or the following:

Brachymyia gen. nov. Head short, broad, antennal prominence well developed in the male, conic, less so in the female. First joint of antennæ longer than the second, third broader than long, transversely oval. Face much produced downward and forward, conical, pointed, tuberculate, cheeks broad. Front short, eyes bare, separated in the male by the tumid ocelligerous tubercle. Body with long pile, abdomen short, broad, arched, without markings. Legs all slender, simple. Third longitudinal vein nearly straight; small cross vein very oblique, near outer third of discal cell.

Brachymyia lupina, sp. nov., ♂ ♀. Face on the sides covered with

yellowish gray pollen, with the broad median stripe and cheeks broadly shining black. Antennae brownish black, first joint twice as long as second; third joint somewhat reddish or brownish black. Front in the female shining black, covered with reddish or fulvous pile or hair, on the sides below pollinose. Frontal triangle in the male pollinose as on the face, the tumid ocelligerous callosity black, opaque, slightly pollinose and with a tuft of long reddish pile. Proboscis in female as long as the thorax, shorter in male. Posterior orbits below tumid, thickly pollinose and with a conspicuous fringe of yellowish white pile. Thorax black, shining, with metallic lustre and reddish or fulvous pile, longer and thicker on the scutellum. Abdomen shining black, with sparse similarly colored pile, the hind borders of the segments narrowly pollinose. Legs black, extreme tips of femora, basal third of tibiae, and basal joints of tarsi, especially the middle pair, a brownish yellow or luteous. Wings hyaline, a faint blackish shade near the tip; near the origin of third vein a narrow indistinct brownish cross band, small cross vein also narrowly clouded; first posterior cell closed in the border of the wing. L. c. 10-13 mm.; l. al. $7\frac{1}{2}$ -11 mm. Four specimens. California.

Brachymyia (? *Eriophora* Ph.) *nigripes* sp. nov., ♀. Sides of face covered with yellowish pollen, broad median stripe and cheeks shining black; front black with black pile. Antennae black, first joint but a little longer than the second. Proboscis long. Posterior orbits fringed with whitish pile below. Thorax black, with fulvous pile in front, across the middle with black, the pleurae, scutellum, and especially the posterior angles, with lighter, yellow, and more bushy pile or hair. Abdomen black, shining; short, broad, and arched; the sides of the second, and all the fourth and fifth segments with thick yellow pile; elsewhere the pile is shorter and black. Legs wholly black. Wings hyaline, a little shaded near the tip, small cross vein faintly clouded, first posterior cell closed before the border of the wing, petiolate. L. c. 14 mm.; l. al. 13 mm. Five specimens. California.

The greater, more woolly pilosity, and the conically produced face leave me in doubt as to its relationship to *Eriophora* Ph. (Ver. zool. bot. Gesell. in Wien. 1865, p. 735, pl. xxvi., fig. 36).

A third species from Maine, rather larger than the last, differs in the two basal segments only of the abdomen being yellow pilose, and the tibiae and tarsi mostly a deep red.

Hadromyia gen. nov. Antennae situated below the middle of the

head, the antennal protuberance of moderate size. Antennae short, third joint obliquely oval, front (♀) rather narrow, somewhat arched, sides nearly parallel. Face deeply concave from antennae to tip, short, without tubercle, arched. Cheek very narrow, descending but a very short distance below the eye. Oval opening large, broad; proboscis short. Posterior orbit not tumid. All the femora very slightly thickened, simple, without spines, or protuberance. Abdomen uniformly black, broad, oval, arched. Sub-marginal cell open. Third longitudinal vein nearly straight, small cross vein quite oblique, beyond the middle of discal cell.

Allied to *Brachypalpus*, but differs in the simple unarmed femora, and the broad, short body.

Hadromyia grandis, sp. nov., ♀. Brassy black, shining. Front black, covered with gray pollen, and (except below) with short yellow pile, slightly intermixed with black at the vertex. Antennae reddish brown, blackish toward the base. Face a dull whitish yellow, cheeks black, shining. Dorsum of thorax from in front of the wings and pleurae thickly covered with short yellow pile. Posterior half of thorax, scutellum, and first three segments of abdomen with thick, short, black pile; fourth and fifth segments of abdomen with longer yellow pile, abdomen scarcely longer than thorax. Legs black with short black pile; knees slightly reddish, anterior tibiae in front, the tips of posterior tibiae behind and anterior and posterior tarsi, with short thick golden pile; middle tarsi reddish. Wings hyaline; costal cell and stigma yellow; posterior cell petiolate. L. c. 23 mm. L. al. 17 mm. Width of head and thorax 6 mm.; of second segment of abdomen $3\frac{1}{2}$ mm. One specimen. Washington Territory (H. K. Morrison).

? *Brachypalpus pulcher*, sp. nov., ♂ ♀. Face yellow with black cheeks, and with or without blackish or brown narrow median stripe; frontal triangle of the male yellow or fuscous; front in the female black, rather narrow, a little broader below, yellow pollinose on the sides, pile short, fuscous. Eyes of male with enlarged facets above. Antennae yellowish brown or black, first two joints short, third obliquely oval, of a lighter color near the base below. Dorsum of thorax and scutellum black, with a bluish or partly metallic reflection, or in better preserved specimens a metallic bronze, the pile of dorsum more fulvous, on postalar callosities, scutellum and pleurae, yellow. Abdomen of a brilliant golden or bluish bronze, with short golden pile and opaque black markings as follows: first segment except the sides, second segment on the anterior

part, and a band beyond the middle of about the same width, somewhat angulated in front, third segment similar, except the anterior border may be quite narrow and the cross band sub-interrupted, fourth segment in male wholly bronze, concealing the hypopygium, in female with very narrow front border and narrow interrupted cross band; the black is attenuated on the sides, not quite reaching the lateral margins. Legs yellow, femora rather stout, anterior and middle pairs mostly brownish or black, sometimes prevailing yellow blackish above, posterior femora varying from a blackish ring near the base, to almost wholly black, below with short black bristly hairs near this end; three last joints of tarsi black. Wings smoky hyaline, stigma yellowish brown, small cross vein near outer third of discal cell. Long c. 12-16 mm., 10 specimens. Mt. Hood, Oregon; Washington Territory (H. K. Morrison).

The fasciate abdomen of this species differs from all known *Brachypalpi*; the spines below the hind femora are also quite small. Its pilosity will hardly allow it to be placed with *Xylota*; besides, the face is not so receding as in that genus. The structure of the head is very much like the preceding genus. Its resemblance to *Sterphus* Ph. (l. c.) from Chili, is quite as great.

Eugeniamyia gen. nov. Allied to *Brachyopa*, but differs in the face being tuberculate, not carinate, rather more produced and less truncate, and in the abdomen being long as in *Xylota*. There are also well developed scutellar, postalar, dorsopleural and mesopleural bristles.*

Eugeniamyia rufa, sp. nov., ♂. Red. Head and antennae yellowish red, first two joints of antennae very short, third joint sub-quadrate, arista plumose. Dorsum of thorax darker, almost brownish red, with very short black hairs, and with two rather broad pollinose stripes, abbreviated behind, and enclosing in front a black spot not reaching the suture. Pleurae with sparse yellowish white pile. Abdomen narrower than the thorax and much longer, nearly bare, shining, somewhat blackish towards the end. Legs red, basal joints of tarsi yellowish, terminal joints blackish, femora considerably swollen, with tufts of yellowish white pile below near the base, the middle and more especially the posterior pairs and posterior tibiae with sparse short bristle-like spines. Wings clouded with brownish on the anterior part, sub-hyaline behind. L. c. 14 mm.; l. a. 10 mm. One specimen, Washington Territory (H. K. Morrison).

* See Osten Sacken: "An Essay of Comparative Chaetotaxy," Mitth. d. Münchener Ent. Ver., 1881.

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ENTOMOLOGY FOR BEGINNERS.

“LONG-STINGS.”

BY W. HAGUE HARRINGTON, OTTAWA, ONT.

Among the conspicuous insects which attract the attention of even non-entomologists, there are few more interesting in their structure and habits, as well as in their relations to other groups, than the large “long-sting” ichneumons with their long triple “tails.” Our two largest species belong to the genus *Rhyssa* (of the Hymenoptera), and as, so far as I am aware, no accounts of them have yet been published in the *ENTOMOLOGIST*, a brief description of their appearance and habits may not be undesirable.

They may be easily distinguished from their relatives (often their victims), the “horn-tails”—*Uroceridæ*—as they are much more slender in body and appendages. The female, readily determined by the extraordinary development of the ovipositor, has the abdomen stouter than that of the male, with the posterior segments dilated and curved under, and bearing the ovipositor, which is constructed essentially of the same parts as is that of a “horn-tail,” only that they are greatly lengthened.

The head, in shape like a short segment of a cylinder, slightly convex before and concave behind, bears on its rounded front a pair of large eyes, from between which spring the long slender antennæ. The head is joined by a small neck to the thorax, which is strongly built and supports two pairs of long narrow wings, as well as the six very long and slim, yet strong, legs. The segment of the abdomen which adjoins the thorax is much less in diameter than the succeeding ones.

The male has a long cylindrical abdomen tapering gradually to the extremity. This, in connection with the prominent head and narrow wings, gives him, especially when in flight, a considerable resemblance to a dragon-fly, from which, however, he is at once distinguished by his long antennæ and shorter hinder wings.

In these insects, as in the Uroceridæ, the hinder-wing has upon its anterior margin a row of minute hooks with which to hold the posterior border of the front one. The number of the hooks is, however, much less, there being only about a dozen scattered along the outer half of the wing.

Of our two species the larger and handsomer is *R. atrata*, of which my specimens vary in length from a little over one and one-quarter inches to nearly two. The head is a rich yellow, with the exception of the eyes and a slight band, bearing the ocelli, on the vertex. The slender antennæ, about an inch long, are also yellow, as, likewise, are the extremely long legs, with the exception of the upper joints of the posterior pairs. The thorax and abdomen are black. The wings, which expand from two to two and three-quarter inches, are transparent, but with a dark smoky tinge. The female is furnished with an ovipositor from *four to five and one-half inches in length*; flattened and scarcely stouter than a hair.

R. lunator is more common, at least in this vicinity, and varies much more in size, the largest specimens being fully twice as big as the lesser ones. The body varies in length from three-quarters of an inch to one and one-half inches, and bears at its posterior extremity an ovipositor projecting from one and one-half to three and three-quarter inches.

The head is yellow with a dark band, in which are inserted the three ocelli, between the eyes, parallel to which runs another dark line which almost encircles the head. Lines also run from the base of the antennæ to the mandibles. The slender antennæ are dark at the base but get lighter toward the tip. The thorax and abdomen are dark brown, ornamented with lines and borders of yellow, which is also the color of the legs. The wings (front pair) expand from one and one-quarter to two and one-half inches, and have a quadrangular dark patch on the anterior border.

The larvæ of both "long-stings" feed upon those of the Uroceridæ and other wood-borers, in which the female ichneumon deposits her eggs by means of the long ovipositor. The method of performing this operation may often be witnessed during the summer by visiting beech trees in which *Tremex* larvæ are at work, but it is difficult to describe clearly its accomplishment and the different postures of the insect during the progress of her laborious and dangerous duty. A series of good drawings would best convey a correct idea of the process, but I do not know of any book in which such are to be found, while some illustrations are very inaccurate. For instance, I saw the other day in a text book of zoology

an ichneumon depicted with her ovipositor fully inserted in the tree and with the *side-pieces or sheaths sticking straight out behind her*. Such an attitude is altogether unnatural, and I am convinced that in that position she would be powerless to extract the ovipositor.

Selecting a suitable tree, if we find no ichneumons at work, we may shortly see one flying strongly and noisily through the sunny woods and settling upon the bark where perforations mark the exits of previous occupants. Here she runs around until she finds a promising spot, as, for instance, the hole made by a Tremex in depositing her egg. Placing herself so that the tip of her abdomen will be above the orifice to be probed, she makes herself as tall as possible, and, by elevating her abdomen and curving under the ovipositor, succeeds in inserting the tip of the latter in the hole.

If the dorsal surface of the abdomen be examined, there will be observed, between the sixth and seventh segments, a gap closed by a whitish membrane. This marks an admirable contrivance to enable the insect to use her seemingly unwieldy weapon, for the membrane is capable of being so dilated as to form a cavity in the posterior part of the abdomen, in which can be coiled a large portion (more than one-third) of the ovipositor, which thus becomes perpendicular under the insect, where it is guided and supported by the sheaths which bend up in loops over her back. By vigorous muscular contractions of the sac, the delicate ovipositor is slowly forced down the larva's burrow, often to its full extent. If a larva be reached an egg is deposited in it, and the ovipositor is slowly withdrawn in a similar manner. This, however, the insect is frequently unable to accomplish, and remains struggling until some bird or tree-toad snaps her up, or she perishes from exhaustion.

I have seen a large *R. atrata* with her ovipositor (five and one-quarter inches long) inserted four and one-half inches into a beech, so firmly that it was only by careful and vigorous pulling that I extracted it uninjured.

The insects are to be found during the latter part of the summer; *R. lunator*, as already mentioned, being much the more abundant.

On the last day of June, 1879, while collecting in a grove just beyond Rideau Hall, I stopped to examine a dead tree for bark and fungi beetles, and was bottling a fine *Penthe pimelia*, when the rustling of insect wings above me attracted my attention. Looking up I saw several specimens of *lunator* flying about the trunk, and a circuit of the tree with closer inspection showed many others walking about on the bark or in various

stages of the act of ovipositing. The tree was a large one, about two feet in diameter, from which the top had been broken off at a height of thirty or forty feet. The rugged bark was dotted all over with *lunators*, often massed in rows or patches, so that there must have been several hundred upon the tree, forming an unusual and most interesting spectacle. The great majority were females, but a number of males were also present. While I was consigning to my bottle a few specimens, a large woodpecker settled upon the opposite side of the tree and began to rapidly thin the ranks of the helpless insects, whose mission, like that of the woodpecker, is the destruction of wood-boring larvae.

A year later, being in the same locality, I visited this tree and found again a number of ichneumonons engaged in the performance of their duty, and also saw sticking out of the bark many ovipositors which had belonged to unfortunate visitors of the previous summer.

DESCRIPTION OF THE PREPARATORY STAGES OF DEBIS PORTLANDIA, FABR.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Obovoid, the base a little flattened, and under the middle thereof is a slight rounded protuberance of lesser diameter; surface smooth; color greenish-white. Duration of this stage 4 to 6 days.

YOUNG LARVA.—Length .13 inch; cylindrical; head twice as broad as any other segment, body tapering slightly from 2 to 13; each segment from 3 to 12 several times creased, making 6 flat ridges, of which the foremost one is broadest, and on this and the fifth ridge each is a minute tubercle and rather long white hair, bent forward, the whole series forming two subdorsal rows, one a little below the other, from 3 to 13; on the middle of side a similar row, one hair to each segment and placed on the second ridge, all of them bent forward; lower down a third series, one to each segment, placed on the fourth ridge, all bent down and back; two short hairs over each pro-leg; on segment 2 are four long hairs on each side, nearly in line, two being subdorsal, the others lateral; on 13 are four hairs in cross row, all curved back, and one on either side behind these; this segment is roundly excavated at extremity, making on either

side a sharp point, which sends back a straight hair; color of body whitish-yellow, in a few hours changing to pale green; head sub-globose, flattened and depressed at top, broadest at base, a little broader than high, the vertices rounded, and on each a slight protuberance, with long curved hair; a similar hair a little below and nearer the suture, and two rows of shorter hairs across face, four in upper, six in lower row; surface corrugated; color yellow, somewhat brown-tinted. Two days later, as the body was changing to green, the head changed to yellow-green. Duration of this stage 6 to 8 days.

After 1st Moul.—Length .26 inch; cylindrical, tapering from 2 and ending in two long, slender, blunt-tipped tails; color of body bright green; much covered with whitish tubercles mostly arranged in longitudinal rows, one being on either side the medio-dorsal line, one sub-dorsal, one infra-stigmatal, and in the intervening spaces are many separated tubercles; each tubercle ends in a short, stiff white hair; under side, legs and pro-legs green; head obovoid, truncated, well rounded on front and sides, depressed at top, the vertices rather high, each bearing a tapering, roughly tuberculated process or horn, which is green with red tip; the face much covered with white, conical, separated tubercles, arranged in vertical rows; ocelli black; color of head green, rather darker than body. To next moult 7 to 8 days.

After 2nd Moul. Length .44 inch; shape as at second stage; color light green; the tubercles of the subdorsal line more prominent, more yellow, and run from horns to tails; another such row along basal ridge; head shaped as before, bright green, the horns long, tapering, green with red tips. To next moult 9 to 15 days, depending on the weather.

After 3rd Moul.—Length .52 inch; shape and color as at preceding stage. To next moult 6 days, in case of a single larva which died soon after the moult. All others have hibernated in stage following 3rd moult.

After 4th Moul, in Spring.—Length .6 inch; color yellow-green; in addition to the dark green medio-dorsal stripe is another sub-dorsal, and a second on mid-side, both narrow, scarcely more than lines. In 11 to 20 days the larvæ reached 5th moult.

After 5th Moul.—Length 1 inch, greatest breadth at segments 2 and 3, 13-100 inch, then tapering to extremity; color as before. In about ten days the larvæ reached maturity.

MATURE LARVA.—Length ♂, 1.2 inch, greatest breadth (in middle segments) .16 inch; ♀ 1.4 in., gr. br. .17 inch; the dorsum much arched and sloping about equally either way from middle segments; ending in two small, short and slender tails; each segment several times creased, the front ridge so caused flattened and about twice as broad as any other, the others equal and rounded; covered with fine whitish tubercles, mostly disposed in longitudinal rows, each bearing a short stiff hair; color yellow-green; on middle of dorsum a dark green band; on the edge of dorsal area a yellow line to tail, and on upper side of this a dark green line; another such on middle of side; along base a narrow yellow stripe; tails pink-tipped; under side, feet and legs pale green; head obovoid, well rounded on front and sides, the vertices high, each bearing a stout tapering process or horn, tuberculated; color yellow-green, the upper part of horns red; the sides of face bear many rather large, white, conical and separated tubercles, disposed in oblique rows; ocelli brown; in one position the largest is green with a brown rim, at other angles it is brown. From 5th moult to pupation 15 to 16 days.

CHRYSLIS.—Length .6 in.; greatest breadth, across base of wings .22, across abdomen .22 inch; cylindrical, the abdomen conical, the wing cases considerably raised along dorsal side; the head case short bevelled transversely to a sharp edge, roundly excavated on the sides, the top rather broad, very little incurved, the corners sharp but not produced; mesonotum prominent, angular, the apex rounded, carinated, the sides flat and sloping; color delicate green, sometimes blue-green, the ventral side of abdomen lighter or whitish; the top of head case and edges of wing cases next dorsum cream color; surface smooth, glossy. Duration of this stage 13 to 14 days.

The chrysalis much resembles that of *Satyrus Alope*; the head case is broader, sharper-edged, the mesonotum more angular and more prominent, and the abdomen more protuberant on the dorsal side; the surface is also smooth, with no granulations.

The caterpillar also somewhat resembles that of *Satyrus Alope*, much more than it resembles any of our species of *Neonympha*, except that the head bears a pair of horns or processes, as do several of the *Neonymphæ*, whereas the head of *Alope* is round. The egg is quite unlike *Satyrus*, of which I have seen several species, all having been rather cylindrical, with vertical ribs. Whereas the egg of *Portlandia* is rounded and smooth, very much as *Neon. Canthus*, but more ovoidal.

In Say's time, (about 1825), this insect was known only as Southern. He says: "It has not been found so far north as Pennsylvania." Gosse, in Canadian Naturalist, p. 246, 1840, mentions seeing an example in Canada. Mr. Scudder, 1863, includes it among the butterflies of New England, but says he has seen only a single specimen from N. E. I find in my notes that it has been taken at Orono, Maine (I think by Prof. Fernald), and on Mt. Holyoke, Mass., by Prof. H. W. Parker. At the West, Lieut. Carpenter has sent it to me from Fort Niobrara, Neb. Gosse, in his Letters from Alabama, p. 122, 1859, speaks of the butterfly (under name of *Hipparchia Andromacha*) as common in Alabama, and mentions its habit of frequenting the foot of a particular tree for many successive days, and sallying out on any passing butterfly, and after performing sundry circumvolutions, retiring to its chosen spot of observation again. He regards it as particularly "social and gamesome."

Portlandia is not a very common species in this part of West Virginia, probably because we have so little open forest at low elevation, the mountains rising abruptly from very narrow strips of bottom land. It is a forest species, not being found in the open fields so far as I have observed. Apparently it must swarm in certain localities in other States. Mr. Lewis Ullrich, of Tiffin, O., wrote me August, 1881, that ten days before he had taken about 150 good specimens, and rejected many not good, in a certain piece of woods near by, stating that they seemed to be confined to this particular spot, and so far as he knew were unknown elsewhere in that county. Mr. Ullrich, at my request, made another excursion, and succeeded in obtaining a female which he tied in a bag over grass, and so got a dozen eggs for me, 3rd Sept. From these I raised five larvæ to maturity. I have myself found great difficulty in obtaining eggs of *Portlandia* by this method, and have repeatedly failed. But twice succeeded, and carried a few larvæ over winter, only to lose all before chrysalis. Except in a single case, when the larva reached 4th moult 18th Sept., and presently died, all I have bred have gone into lethargy soon after 3rd moult. But the eggs have always been laid late in the season. Two moults are passed in the spring, but probably 4 moults are all which larvæ of the summer broods require. I have taken the butterfly, in different years, as early as 18th May, and through each month to 1st Sept., and I apprehend there are three annual generations here, the first in May, the second middle of July, the third late in August, as I have taken fresh examples at these times. Say describes the caterpillar briefly, thus:

"The caterpillar is downy and bimucronate behind." And the chrysalis: "The pupa is suspended by the tail; it is angulated, bimucronate on the front." Mucronate means in his glossary "terminating in a sharp point." That will do for the caterpillar, as it is tailed, but the chrysalis is wrongly described, its head case being square, without sharp points, or processes. Bois. and Lec. give a very fair representation of the chrysalis after Abbot, but the caterpillar is badly done, the head and its processes being quite out of drawing. Boisduval's description is drawn from the figure, not from nature, and of course is wholly incorrect, and he remarks that the two points which surmount the head spring up in the form of ears (*s'élèveut en forme d'oreilles*), as indeed they do, funnily enough, in the cut. The face is as that of a grasshopper, and the "ears" are as of a kangaroo, and the whole thing foreshadows a "gamesome and frolicsome" butterfly.

ON THE APHIDIDÆ OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY WM. H. ASHMEAD, JACKSONVILLE, FLA.

(*Paper No. 3.*)

Section SIPHONOPHORINI.

Genus SIPHONOPHORA, Koch.

The species of this genus already described from North America are as follows:

1. *S. rudbeckiæ*, Fitch.
2. "*ambrosiæ*, Thomas.
3. "*rosæ*, Reaum. A variety of this species I find here on cultivated roses and on the wild Cherokee rose. It differs very considerably from Prof. Thomas' description, and may be known as *S. floridæ*.

I submit following description:

S. rosæ, var. *floridæ*, n. s.

Wingless female.—Length .07 inch. Elongate ovate; pale shining green; eyes red; beak very pale and short, not reaching to middle coxæ,

widening before tip, tip black; antennæ 7-jointed, reaching to base of honey-tubes, annulated with brownish-red at joints; honey-tubes long, reaching beyond tip of abdomen, pale greenish, very slightly infuscated at tip; style short, conical, pale green; legs uniform pale green, feet very slightly infuscated.

Winged individual.—Length .06 inch. Elongate ovate and shining green. Vertex of head reddish; eyes brown; antennæ reaching beyond tip of abdomen, dark brownish black, excepting basal joints, which are pale; thorax shaded with brown; abdomen pale; legs pale greenish yellow, knees black; wings hyaline, veins greenish yellow, discoidal vein black.

4. *S. avenæ*, Fab.

5. "*viticola*, Thomas. First detected here early in March on wild grape vines growing in our swamps; later it becomes quite common on cultivated vines.

6. *S. setariæ*, Thos.

7. "*euphorbiæ*, Thos.

8. "*euphorbicola*, Thos.

9. "*asclepiadis*, Fitch. Very common here in early spring on *Asclepias cornuti*.

10. *S. erigeronensis*, Thos.

11. "*cereopsis*, Thos.

12. "*lactucæ*, Linn. Occasionally found here on lettuce.

13. "*polygoni*, Walker.

14. "*salicicola*, Thos.

15. "*verbenæ*, Thos.

16. "*rubi*, Kalt. Rarely found in early spring on under surface of leaves of *R. villosus*.

17. *S. pisi*, Kalt.

18. "*gerardiæ*, Thos.

19. "*heucheræ*, Thos.

20. "*cucurbitæ*, Thos.

21. "*tanacetii*, Linn.

22. "*fragariæ*, Koch. Var. *immaculata*, Riley.

23. "*menthæ*, Buckton.

24. "*absinthii*, Linn.

25. "*achyranthes*, Monell.

26. "*calendulla*, Monell.

27. *S. tulipæ*, Monell.
28. "*crataegi*, Monell.
29. "*sonchi*, Linn. Syn. *sonchella*, Monell.
30. "*calendulæ*, Monell.
31. "*tiliæ*, Monell.
32. "*liriodendri*, Monell.
33. "*prunicola*, Ashmead, Pacific Rural Press, 1881.
33. "*citrijolii*, Ashmead, Orange Insects. p. 65, 1880.

DIMORPHISM AMONG THE SIPHONOPHORA.

For many years dimorphism, viviparousness and parthenogenesis among insects have attracted universal attention. Not only from the fact of the rarity of their occurrence, when we take into consideration the countless insect hosts of varied forms, sizes and colors that constitute what may be termed the insect world; but to the biologist, the naturalist and the philosopher, they are of the most profound and absorbing interest as bearing upon some of the great unsolved questions of the day. A careful study of the economy of any one of the billions of animated forms that exist around us, will certainly unfold some hidden truth, give a glimpse, or reveal some knowledge of that mysterious, omnipotent and almost unknowable force pervading the universe. And will not facts derived from these studies enable mind—the supreme, the attainable—to grasp truths unattainable without them? Since Darwin's wonderful revelations in regard to earthworms, I have had the profoundest respect for them; and as I pass on my way to my business in the early morning and turn up with my foot their dwellings, disclosing their tortuous night work, I feel like bowing to them and saying: Oh, wonderful earthworm! You, too, are worthy of respect and admiration; for hast thou not during countless cycles of ages been helping to build up and beautify the universe and render it a fit habitation for man!

The subject under consideration has had the closest attention from some of the more thoughtful students of Entomology in this country, as well as in Europe. America may well feel proud of her investigators in this particular field of research, among whom may be mentioned Benj. D. Walsh, discoverer of dimorphism among the Cynipidæ; H. F. Bassett, who so ably continues the studies and adds to the discoveries respecting the habits of this family, since Walsh's death. We younger Entomologists may well imitate the example of W. H. Edwards, whose very thorough

and able investigations and experiments with the diurnal Lepidoptera have thrown such a flood of light on dimorphism and what really constitutes "a species ;" and last, but not least, Prof. C. V. Riley's similar discoveries among the Phylloxeræ and Pemphiginæ. All have done much towards elucidating the vexed question.

Among the Aphididæ proper, although it has often been suspected in America, no recorded instance of dimorphism among them, that I am aware, exists. The discovery of its occurrence in the Orange Aphis, *Siphonophora citrifolii*, described by me in my pamphlet on "Orange Insects," in the fall of 1880, therefore is of great interest, and no doubt will prove such to many readers of the CAN. ENTOM.

From observations made this year I find that from an egg laid by a fall oviparous female hatch the brown-black and black winged male and winged viviparous female, which I describe as follows :

Young.—Length .02 inch. Dark greenish brown, with dark eyes and glassy white antennæ and legs.

♂.—Length .04 inch. Color brown and brown-black; antennæ brown, legs pale or yellowish, posterior femora slightly shaded above with brown or black; feet reddish; nectaries shorter than in female; wings hyaline, stigmal spot pale.

These are rare among the first broods, and afterwards almost or entirely disappear.

♀ Apterous.—Length .05 to .06 inch. Broadly ovate. Dark brownish black. Head between antennæ reddish; antennæ 7-jointed, pale yellowish, apical ends of joints 3, 4 and 5 brown, 6th shortest, 7th long, setaceous; legs pale yellow, latter two-thirds of femora brownish or blackish, tips of tibiæ and claws brown; nectaries slightly thickest at base, black and cylindrical; cauda distinct.

♀. Winged viviparous. Length .06 inch. Color black and shining; eyes red-brown, tubercles of antennæ black, vertex of head reddish; rostrum reaching back of middle coxæ; antennæ not quite reaching to tip of abdomen; abdomen variable, brown-black, brown or olive-green; nectaries long, cylindrical and black; cauda long and recurved, dark; wings hyaline, stigma rather broad, brown, obliquely sharpening to a point at outer edge towards apex; stigmal vein strongly curved, three oblique veins, the third forked; hind wings with two oblique veins, in some specimens but one.

I have watched these viviparous females breed on my orange trees, and the rapidity with which this is done is simply astonishing. In a few days broods upon broods, or young colonies, seem to exist on all the tender new leaves and shoots, and still the parthenogenetic young keep coming. Verily, if it were not for the chalcid flies, ichneumons and other parasites, they would be the death of the trees. By the middle of March a change takes place in the broods. The young differ from their parents in shape, color and size! So different are they as to discredit belief, and had I not watched them breeding day by day on my orange trees, I should have felt justified in describing them as a distinct species. They are undoubtedly a dimorphic form, and I give below a description:

Dimorphic, viviparous, apterous female.—Length .08 to .09 inch. Elongate; color a uniform pale pea-green, with more or less of a longitudinal shading of a darker green on dorsum, with the surface more or less corrugated; eyes bright red, with a prominent facet or ocellus springing out from hinder edge of same, giving it a toothed like appearance; antennæ 7-jointed, pale glassy green, in mature specimens the tip from 5th joint is reddish; legs of the same uniform pale green, with only feet red; abdomen at tip somewhat pointed; nectaries very long and thin, slightly curved, slightly swollen in middle, and pale green; cauda small, conical. Beak does not quite reach to tip of middle coxæ.

The winged form agrees in every respect with above description, and can only be distinguished by having wings, the veins of which are very pale. These are rare, the majority being wingless.

The mature viviparous female continues breeding and can often be found surrounded by from 20 to 30 pale green young; occasionally a brown one will be found among them. These continue breeding for several generations, ultimately giving place to the original type, and by the last of April none can be found. Why this change of form occurs is yet a mystery, and needs further investigation. Towards the end, all seem to be parasitized by a *Trioxys*, *T. testaceipes* Cresson, which thoroughly eradicates them.

34. *S. solanifolii*, n. sp.

Wingless female.—Length .12 inch. Elongate ovate and of a pale yellowish green color; beak short, not reaching middle coxæ, pale, tip black; antennæ 7-jointed, slightly reaching beyond abdomen, situated on large tubercles, pale greenish, joints infuscated, 6th joint shortest, dark,

7th longest, brown ; eyes red ; honey tubes very long, reaching considerably beyond abdomen, slightly thickened at base, infuscated at tip ; style short, conical, greenish ; coxæ shining and yellowish, feet black.

♂. Length .05 inch. Black. Beak reaching to middle coxæ, apical half black ; antennæ black, hardly reaching to middle of abdomen ; honey tubes rather short, black ; all coxæ black, anterior and middle legs pale greenish, tips of tibiae and feet black, posterior pair, excepting apical half of femora, which is greenish, brown.

Only two males were secured out of hundreds of apterous individuals, and these are remarkable for being so much smaller than the females.

Found feeding on the Pepper Vine, *Solanum jasminoides*.

THE HOP-VINE BORER.

BY CHARLES R. DODGE, WASHINGTON, D. C.

The casual reader, calling to mind only the half dozen hop-vines usually seen about the kitchen garden, or trailing upon some farm out-building, can hardly realize the possible losses to hop growers by insects. According to the last census (for 1879) New York State alone had over 39,000 acres in hop yards, producing nearly 22 millions of pounds of hops, which, at an average of 28c. per lb., would aggregate a value of over six million dollars. Bearing these figures in mind, with an annual loss of 10 per cent. from only one insect—the hop borer—(and 25 to 50 per cent. of injury has been reported) a loss of \$600,000 would result in this single State.

With such a destructive agent in the hop field, is it not a little singular that there is little or nothing "in the books" on the subject, and that the pest is in all probability an unknown and undescribed species? I am not able to give its name—Prof. Comstock writes me he is working it up—but as I have accumulated a mass of interesting data on the subject in my census work, I deem it proper to make known now the experience of intelligent growers in different sections of the country, for the benefit of those who have not yet learned how to fight the pest, leaving the scientific name and details of habits and natural history to be supplied hereafter.

The only mention that I can find of an insect boring into the crown of the hop plant, in the manner set forth by my numerous correspondents,

occurs on page 33 of the Report of the Entomological Society of Ontario for 1872, by Rev. C. J. S. Bethune. As an appendix to his paper on Hop Insects, he gives descriptions of an unknown larva feeding "upon the crown of the root," and which he was unable to rear. The size of the larvæ and the general points of description agree so well with the unscientific descriptions given by my correspondents, the growers, that I unhesitatingly pronounce them to be the destructive hop borers, which are the subject of this paper.

The pest has been known to cultivators of the hop for many years—indeed it is reported from Oneida county that it has always been known in the locality—and other hop growing districts have felt its presence for longer or shorter periods. In Juneau county, Wisconsin, it was first noticed in 1867, while the observer in Waupaca county had not noticed it prior to 1881. The percentage of destruction varies in different sections from almost nothing, where kept under control, or yards are new, to 25, 50, and even a greater percentage where the yards are old, badly infested, or not looked after. These facts lead a New York grower to state, in his opinion, that it is best to abandon yards after six or eight years' culture, and change to new ground, for "grubs will get into a yard after two or three years, gradually increase, and in eight or ten years spoil the yard." Other growers contend that only the yards of the ignorant and shiftless are ever damaged to any extent by the borer.

I shall not attempt to give a description of the larva here further than to say that all correspondents agree in the statement that it is an inch and a quarter to an inch and a half in length, and three-sixteenths to one-fourth inch in diameter at maturity, whitish or light gray in color with a dark head.

As soon as the vines start from the ground in May and June, and when but a few inches high, the mother insect begins the attack by depositing her eggs upon them. The subsequent injury is thus described by Mr. Pierpont, a large grower of Ontario county :

"The warm sun hatching the egg deposited in the head of the hop vine, soon after it is out of the ground, it soon becomes a lively worm about one-fourth of an inch in length, subsisting upon the sap of the vine. It leaves the head of the vine soon after hatching, enters the ground, bores to the centre of the vine and works up an inch or two, finally locating where the vine starts from the crown, eating at this point and at the crown until the vine is nearly or quite destroyed, and the crown weakened by water getting in, causing decay, and finally the destruction of the entire hill."

Another report states that the insect begins work in the latter part of June by eating into the tender vines where they start from the old crown or bed root ; and unless prevented, will eat the vine entirely off, thus destroying the crop ; " many times they poison the root so that the whole hill dies." Old yards die from this cause more than any other, as the borer prevails more in old than in newer ones.

Another grower states that the damage commences about the last of May or first of June, when " the head of the vine will appear slightly bent or curved, if compared with sound ones. The grub, after feeding a little time in the heart of the head, drops to the ground and makes its way into the heart of the vine below the surface of the ground, working deeper as it grows larger. The vine wilts and finally dies."

There is great diversity of opinion among growers as to the best means of ridding a yard of these pests. A few take for granted that there is no remedy, leaving the skunks to carry on the warfare alone ; and right here it may be stated that growers east and west speak most favorably of the friendly offices of this much despised animal, in the hop yard. Salt is mentioned by many growers as a remedy. It is put on after the vine has become somewhat toughened, from middle to last of June, salt on the tender new stalks killing them in a short time. Lime, ashes, sulphur, &c., are also recommended, but doubtless do little real good. Some growers emulate the skunks by digging out the grubs, often doing more damage than the pests themselves.

Mr. Pierpont says an experienced tyer of hops can tell at a glance the head containing a worm, which is crushed in an instant, but this process can only be practiced for a few days, as the worms leave the head soon after hatching. Next to the crushing process a useful remedy is to hill the hops as soon as possible and give the yard thorough cultivation. The hilling causes fibrous roots to put out above the operations of the grub and save to some extent the crop.

The most detailed statement of experience, and it seems to me the best remedial agency or means of prevention, is furnished by Mr. J. F. Clark, a grower of Otsego county, New York, who writes as follows :

When the vines are well up the poles, and at the first hoeing about the last of May or first of June, the dirt should be carefully worked away from the vine by the hoe ; all the dirt remaining between the vines must be carefully worked out with a sharpened stick, so that all the vines will be left bare as low down as where they leave the bed root ; thus they become

toughened by the weather and are not so attractive to the grub. Immediately after this operation, a good handful of the following compost should be applied directly around the root and vine: Take equal parts of salt, quick-lime and hen-manure; place the lime on the floor first, and throw on water enough to thoroughly slack it; immediately spread the salt on top, following with the hen-manure. When the lime is well slacked, mix the whole thoroughly, and in a couple of weeks it will be ready for use, as above. Do not hill up the hops until the latter part of July or first of August, and the yard will not suffer any from grubs, but will remain clean and free from weeds the remainder of the season. When yards are hilled earlier than stated above, the grub sometimes works in them more than in late hilled ones.

To return to the skunks. They seem to have acquired the digging-out process to perfection—far better than the hop grower—as they are able to dig around the hills without the least injury to the vines. In Juneau county, Wisconsin, this little fellow—with an appetite for juicy grubs only equalled in degree by the pungency of his perfume—is the only positive remedy, as he works about the hop-hills or roots, cleaning out the worms in a few nights. One grower says: “I have seen ten acres where not a dozen hills would escape their little noses.”

It is worthy of note that in a majority of cases the growers report the borer as the most injurious insect in the hop yard, not excepting the hop-aphis.

LEAF-MINING ANTHOMYIDÆ.

BY J. A. LINTNER, ALBANY, N. Y.

Among our American species of Anthomyidæ, none have hitherto been known as leaf-miners. Several are depredators on the roots of garden vegetables, as indicated by the specific names of *Anthomyia ceparum*, *A. brassicæ* and *A. raphani* (the onion fly, cabbage fly and radish fly); some occur in excrementa, and one, a few years ago, was discovered as preying upon the eggs of the Rocky Mountain locust. During last year and the preceding a species (*A. betæ*) which had been almost unknown since its publication in 1860, has been seriously damaging the leaves of beets, in England, by mining them in tortuous channels and large blotches,

causing them to shrivel, dry up and die. In two counties alone, 1,624 acres of mangolds were infested (Ormerod). This last summer some *Anthomyia* larvæ were discovered by me in Middleburgh, N. Y., extensively mining the leaves of the garden beet (*Beta vulgaris*). Judging from published descriptions and figures, I believed it to be identical with the European species of the same habits, and that it had been a recent importation thence. Examples of the eggs, larvæ, puparia and flies were sent by me to Mr. R. H. Meade, of Bradford, England, who has been recently making special study of the Anthomyiids, and particularly of the North American species, as may be seen in a paper in the March number of the last volume (xiii) of the CANADIAN ENTOMOLOGIST, giving the result of his study of the collections in this family, belonging to the Museum of Comparative Zoology at Cambridge, Mass. Mr. Meade finds, among the examples which I sent to him, reared by me from my larval collections at Middleburgh, no less than three distinct species—all differing from *A. betæ*—two believed to be undescribed—and one identified as *Chortophila floccosa* Macq. It seems somewhat remarkable that all these should have been obtained from larvæ feeding at the same time, upon a small garden bed of beets, containing about fifty square feet of surface. The description and general history of the new species will probably be given in my forthcoming Annual Report.

NOTES ON ISOSOMA ELYMI, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

In my notes in the March number of the CAN. ENT., the idea is conveyed that this species obtained from the wild Canada rye grass, may prove to be identical with the wingless form obtained by Prof. Riley and myself from wheat stalks, and which Prof. Riley has since named in the American Naturalist, *I. Tritici*. At the same time doubt was expressed as to their identity, because at the time of writing there were still larvæ in the grass straws, while *I. Tritici* pupated in the fall, both in the breeding jars and in the field. Since the article mentioned has appeared, I have

obtained from my grass stalks several more specimens, and I believe the two forms to be entirely distinct. A specimen was sent to Prof. Riley, upon the receipt of which he wrote as follows:

"It is undoubtedly distinct from *I. Tritici*, as is shown not only by the greater length, stouter body, darker color of the antennal scape and constancy of the winged form, but also by the punctuation (most markedly), by the shape of the mesothoracic scutum, and by the color of the meso-scutar parapsides. It comes in fact nearer to *Hordei* than to *Tritici*, though, as you say, it is well distinguished from the former by the punctuation."

Five specimens were obtained. These measured: two .12, one .14 and two .15 of an inch in length, and all were winged females, the male not being as yet known. The body robust, much like *Hordei*, the head and thorax rather coarsely punctured, but less so than in *Hordei*. The scape of the antennæ black, the rest brownish black; legs black, the articulations and feet, except the last joint, tawny, the tibiæ scarcely lighter than the femurs and trochanters. Spot on side of prothorax and tips of ovipositor tawny. This is less hairy than *Tritici*, more in that respect like *Hordei*. It may be stated here also that it differs from *Hordei* in the place where the larvæ are found, these being on the interior of the culm in the central hollow, and making no galls, while the larvæ of *Hordei* are found in galls in the outside tissue of the culms.

CORRESPONDENCE.

THE DEVELOPMENT OF A LUNA.

DEAR SIR,—

On the evening of the 12th of April, being at the residence of Mr. J. Johnston, a noise proceeding from his hatching box attracted his attention. Upon looking for the cause, he found a Luna just emerged, the fifth from a batch of nine cocoons which he had raised from the egg. Its body and wings seemed to be quite dry, and were a pure downy white, with the exception of the costal band, which appeared disproportionately

large, and a minute dark speck for the eye spot. It was remarkably active and did a great deal of rapid travelling before it came to rest, which it did at last quite suddenly on the end of a twig, and then never moved except to better secure its foothold. Mr. Johnston placed it in a suitable position under the full light of the lamp, that we might watch its progress to maturity. The first change noticed was the appearance of a bright green spot near the base of the front wing, and as that enlarged the wing expanded, very slowly at first, but more rapidly as it increased in size, the green coloring matter flowing along between the upper and under membrane of the wing, becoming more delicate in its shade as it spread first along the front of the wing, and had reached the apex before it extended through the inner half; but by the time it had touched the extremity of the whole outer angle the size, form and color of the wing were complete.

In the meantime the hind wing had not yet doubled its original size, with the part from which the tail was to come showing as a slight break on an otherwise even edge; the same routine was followed in the development of the hind wing as in that of the front, and by the time the broad part of the wing had attained its full size, the tail was a little more than half an inch long and very much crumpled. This was the last part to expand, but as the fluid passed into it, it also took size and form. The whole time occupied in the operation, from first seeing it until it was completed, was about one hour and three quarters.-

J. ALSTON MOFFAT.

DEAR SIR,—

I send the following from my Entomological notes: October 10, 1881, I discovered a male *Pieris rapae* coupling with a female *Pieris protodice*. I placed over them a wire screen, as they were in a bunch of mustard. Next morning I discovered that the male was dead. The female soon deposited (in open day) her eggs on the mustard plants. They hatched out and a part of them moulted the second time, but they finally all perished.

On Dec. 27, 1881, and February 15, 1882, I disturbed some boards in my garden, when a female *Aletia argilacea* in each case flew out. They were captured; the first was perfect, the latter not quite fresh. As this has been the most remarkably warm winter we ever experienced in Wisconsin, it is not strange that the *Aletia* could survive. On Feb. 15th the

farmers were plowing, bluebirds, robins, meadow-larks, red-headed woodpeckers and cedar birds were numerous.

P. R. HOY, Racine, Wisconsin.

REMARKS ON THE DESCRIPTION OF *CAPIS CURVATA*, GROTE.

DEAR SIR,—

In Vol. xiv of the CANADIAN ENTOMOLOGIST, at p. 20, Mr. A. R. Grote described *Capis curvata*, n. g. et sp. As a generic description this is certainly an extraordinary specimen of incomplete work. The species might be recognized, but the genus certainly can not be from the description. Genera are supposed to be based only on structural characters, and I presume that the remarks on structure contained in the description referred to, apply to the genus. Let us see of what these consist: "Antennæ simple"—an unimportant generic character, for many of the genera have the antennæ of its species both simple, ciliate and pectinate. "Ocelli."—Considering that there are 250 or more genera to which this can be applied, this does not help us much. "Labial palpi moderately projected, 3rd article short, a little depending."—This will apply to the majority of the Deltoidæ, and to many of the other genera; how they are projected, whether curved upwards or straight, Mr. Grote does not say; neither does he state how the palpi are clothed—a very important character in the Deltoidæ. "The form and outline of *Lisyrhypena** (? *Sisyrhypena*), but the wings shorter and broader." What form and outline has *Sisyrhypena*? Is the student expected to hunt up the description of that genus, only to find that the wings of that genus are compared with that of some other?

No one knows better than Mr. Grote the essentials of a good generic description, but he entirely omits any reference to the eyes, whether hairy, lashed or naked; there is no mention of the tibiæ, whether spinulated or not; no mention of the character of the vestiture, whether hairy or scaly, and nothing said of the tuftings, if any, or whether they are entirely absent.

There is doubt and trouble enough to assail the student in the older works, without adding to his burdens such descriptions as that of *Capis*, and expecting him to recognize it.

JOHN B. SMITH, New York.

* *Lisyrhypena* was a typographical error. It should have been *Sisyrhypena*.—ED. C. E.

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THE PICKLED FRUIT FLY—*DROSOPHILA* *AMPELOPHILA*, LOEW.

BY G. J. BOWLES, MONTREAL.

In August, 1879, I met with a small Dipterous fly, *Drosophila ampelophila* Loew, in considerable numbers, and as the subject is of interest to entomologists, I give the result of my observations. I have to



Fig. 10.—*Drosophila ampelophila*: Fly and Wing.
Magnified 10 diameters.

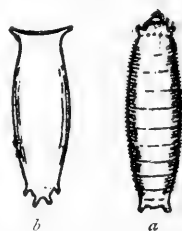


Fig. 11.—*Drosophila ampelophila*:
a, Larva; b, Pupa. Magnified 7 diameters.

thank Professor Hagen, of Cambridge, for the determination of the species and other information, and also Professor Lintner, of Albany, for a copy of his article in the "Country Gentleman" of 1st Jan'y, 1880, on this insect, and from which I have largely drawn.

With regard to the genus, Professor Lintner says: "Twenty-five North American species of *Drosophila* are catalogued, which have all, with the exception of three species common to Europe and America, been described by Dr. Loew, the distinguished Prussian Dipterist, and Mr. Walker, of the British Museum. They have not been studied by our American entomologists, and consequently nothing is known of their habits. I find no reference to a single determined species by any of our writers." In the "American Naturalist," vol. 2, page 641, an unknown species of *Drosophila* is noticed as infesting apples, preferring the earlier varieties. The larvæ penetrate the interior of the apple in every direction, and if there are several working together, render it quite unfit for use.

Dr. Packard, in his "Guide," page 415, figures an unknown species as the "Apple Fly," which is believed to be the above species. Mr. Walsh in vol. 2 of the "Practical Entomologist," also gives a brief notice of a larva supposed to be that of a species of *Drosophila*, and which also were injurious to an apple crop in Vermont to the extent of about half its value, by boring the fruit in every direction.

Professor Lintner further says: "The different species of *Drosophila* vary considerably in their habits, as we learn from European writers; and, indeed, the same species seems often to occur under apparently quite different conditions. The larvæ of the European *D. cellaris* occur in fermented liquids in cellars, as wine, cider, vinegar and beer, and also in decayed potatoes. *D. aceti* Kol. infests decayed fruits. Its larvæ occupy about eight weeks in attaining their growth, and their pupal state lasts for ten or twelve days. The flies appear in May and June. *D. funebris* has been reared from pupa taken from mushrooms. It is sometimes known as the vinegar fly. Another European species, *D. flava*, is stated by Curtis to mine the leaves of turnips, raising blister-like elevations on their upper surface."

The present species, *D. ampelophila*, is described by Loew in his *Centuria Secunda* (Dipt. Amer. Sept. indigena), No. 99, page 101. It is exceedingly common (Professor Hagen states) in the southern parts of Middle Europe and in Southern Africa, but the only localities given for it in America, in Loew and Osten Sacken's Catalogue, are the District of Columbia and Cuba. Professor Lintner, however, has bred it in New York; it also occurs in Pennsylvania, and now Montreal must be added to the list. I also think, from observations made in Quebec, that it, or an allied species, is found there. At any rate, this immense area of distribution for such an insignificant insect is very remarkable.

Like the other species of this genus, and so many other dipterous insects, the larva of *ampelophila* feeds on decaying or fermenting vegetable matter. Professor Lintner bred it from pickled plums; in Pennsylvania it fed on decaying peaches, and I found it in pickled raspberries. An earthenware jar had been nearly filled with this fruit and vinegar, prepared by the good housewife for the purpose of making that favorite drink (in Canada at least) called raspberry vinegar. On opening the jar about ten days afterwards (16th August, 1879) it was found to be swarming with the larvæ and cocoons of the insect. Hundreds of the larvæ were crawling on the sides of the jar and the under side of the cover, while pupæ were

found abundantly, singly and in clusters, particularly where the cover touched the top of the jar. The short time required for the production of so many individuals was surprising. I half filled a covered tumbler with the pickled raspberries and larvæ, and they continued to produce flies for several weeks. I regret not having more attentively observed the exact time required for the different stages, and can only say that its growth from the egg must be very rapid, and its pupal state does not last longer than ten or twelve days.

The larvæ, when full grown, are nearly one-fourth of an inch long, somewhat tapering towards the head, which is small; and are sparsely covered with minute hairs, particularly on the divisions of the segments. They have no feet, but can travel quite rapidly on glass, seeming to retain their hold by a glutinous condition of the skin, and moving by extending and contracting their bodies. They seemed to exist with ease either in the vinegar or the air, moving through the former in search of food, and sometimes coming out of it, and either resting or moving about on the glass sides of the vessel. Their bodies were quite transparent, and under the microscope their internal organs could easily be seen. At both ends of their bodies are curious projections or tubercles, which are also seen in the pupa.

The puparium is about three-sixteenth inch long, oval in shape, and yellowish brown in color, with the tubercles at head and tail before referred to.

The fly measures about one-eighth of an inch in length, with a large rounded thorax, long legs, and broad iridescent wings. The whole insect is yellowish in color, and very hairy, even to the proboscis. Some of the hairs on the head bear three or four branches. The wing forms a very beautiful object for the microscope.

Last year the flies were attracted to some raspberry wine in process of fermentation, hovering about the jars and alighting upon the corks, evidently seeking for an opening through which they might pass to lay their eggs. It is doubtless in this way that fruit is attacked by this or some allied species. The minute fly effects an entrance beneath a not closely-fitting lid, and deposits its eggs on the fruit, or upon the side of the jar, whence the young larvæ make their way to the fruit, or find their sustenance in the liquid.

During the past summer I was desirous of again testing the matter. A few raspberries, with a small quantity of vinegar, placed in a pickle

bottle with a loose cover, were quite sufficient. A fortnight afterwards, a number of larvæ were seen in the bottle, and several pupæ were attached to its sides. Absence from home, however, interfered with the carrying out of the experiment. It could easily be tried this season by some of our entomologists, and the time required for the transformations of this curious fly be determined, as well as the further extent of its distribution.

The outline drawings were made under the microscope, and give a fair idea of the insect. Every part of the fly is covered with hairs of different lengths, as indicated in the figure. The branched hair on the head is faithfully copied from a specimen, but in others it was not so largely developed. The wings are beautifully edged with hairs, and the membrane is also studded with them. The fly was drawn in the position given, so as to show its extremely long legs, and the curious shape of the thorax and abdomen.

REMARKS ON AGONODERUS COMMA FAB., PALLIPES FAB.,
RUGICOLLIS LEC., AND TACHYCELLUS (*Bradycellus*)
ATRIMEDIUS SAY.

BY JOHN HAMILTON, ALLEGHENY, PA.

Experience in exchanging Coleoptera shows that the first two and the last of these forms are greatly confused in collections. Their appearances are so similar as easily to deceive, and they are only to be separated by a close observance of two or three characters. *Comma* and *atrimedius* are abundant here, and *pallipes* is not rare. *Comma* and *pallipes* are usually confounded, the former being labelled *pallipes*; and *atrimedius* is often marked *pallipes* also. The typical *comma* has a black vitta on each elytron extending from the first to the fifth stria, which does not reach the apex, and may be more or less abbreviated anteriorly. The vitta on each elytron is therefore separated by a yellow suture. The scutellar stria is long. The typical *pallipes* has a broad black vitta on the disk of the elytra extending from the fourth stria on one side to the same on the other, and not separated by a yellow suture. It does not reach the apex and may be abbreviated in front, in which case it is narrowed towards the scutellum. The scutellar stria is short. The thoracic characters are

omitted here, being so inconstant as to be of no diagnostic value. Had all the specimens of each species the typical coloration as given, recognition by this character would be easy; but the extent of variation is so great as to render it absolutely useless. While I have not yet seen a specimen of *comma* without the yellow suture, many specimens of *pallipes* occur with it where the broad elytral vitta is abbreviated and disintegrated so as to form a short, narrow vitta on each side. The vitta of *comma* is similarly reduced, and the separation by color becomes impossible. In other specimens of each the colors are so suffused and blended as to present no typical characters.

The length of the scutellar striæ, then, is the only character to be relied on for separation. That of *comma* is said to be *long*; that of *pallipes*, *short*. Neglect to define the relative lengths, no doubt, gives rise to the confusion where the two species do not inhabit together, and material is not at hand for comparison.

In *pallipes* this stria may be termed rudimentary. The examination of near one hundred specimens shows it to be merely basal, and not to extend notably along the plane of the elytron behind the commencement of the declivity, while in *comma* it is quite conspicuous, and about half a line in length.

Rugicollis is Californian. The scutellar stria is as in *pallipes*. The typical specimens have a short black vitta on each elytron from before the middle backwards, and occupying the 2nd, 3rd and 4th striæ. Specimens of *pallipes* occur with exactly the same marking. Apart from a certain microscopic rugosity of the thorax, and a little less convexity of the elytral interstices, both of which may be evanescent in a large series, I see nothing to distinguish them, except locality.

Tachycellus (*Brachycellus*) *atrimedius*.—Many individuals of this species simulate in the form of the thorax and in coloration of the elytra specimens of the foregoing. The scutellar stria is as in *pallipes*. This at once distinguishes it from *comma*. Besides the generic character of the mentum, the antennæ and hind tarsi separate it from *pallipes* readily. The three basal joints of the antennæ are *glabrous*, and the tarsi are *long* and *narrow*, the first joint being one-half longer than the second. In *pallipes*, etc., the same tarsi are short, the joints broad and hairy. The typical *atrimedius* has the hind angles of the thorax sharply rectangular, but in many specimens they are considerably obtuse, and the four species

approximate so closely in this respect in individuals that this character fails.

The above forms can all be very satisfactorily determined where they depart from typical marks, by the observance of the above characters, which may be thus stated :

Hind tarsi *short*, joints not longer than wide.

Scutellar striæ *long*. *Comma*.

“ *short*. *Pallipes*.

“ “ Thorax usually finely rugose (California). *Rugicollis*.

Hind tarsi *long*, joints narrow, first *one-half* longer than second.

Scutellar striæ *short*. Three basal joints of antennæ *glabrous*.

Tachycellus atrimediis.

This paper is not intended to touch on the question of whether the three first mentioned are species, or at most, varieties. Say did not separate *pallipes* and *comma*; the species now recognized as *comma* he describes by the former name, and his variety B is the true *pallipes* Fab., according to the bibliography.

The American Entomologist, vol. iii., p. 154, states, as the opinion of Dr. G. H. Horn, that *comma* and *rugicollis* are synonymous with *pallipes*.

NORTH AMERICAN GEOMETRIDÆ.

BY A. R. GROTE.

I have indicated in this short paper where the types of my Geometrid species are to be found, to the best of my knowledge, and I have given such additional information as I am possessed of with regard to the species. I have followed the classification of Dr. Packard, except in a few instances where I have found reasons to prefer other names. I refer to my paper, Can. Ent., 8, 152, for a review of the synonymy of certain species. Two species, one described by Dr. Harvey (viz., *Endropia Warneri*), have been re-named by Dr. Packard, who calls Dr. Harvey's species *Apiciaria*. As to whether we must put the terminations *aria* and *ata* (accordingly as the ♂ antennæ are pectinate or not) I cannot attempt to decide. I think it is advisable to bear this rule in mind when naming

species, but I would not change therefore any names already in use. Especially do I think it inadvisable to place the termination after a proper name. I should call the *Endropia*, *E. Warneri*, not *E. Warneraria*.

To the following names of our species the reference to the plate is given where they have been figured. The type of *Eutrapela* is the European *Lunaria*. I would therefore retain Gueneé's name *Choerodes* for the genus of which *Transversata* is the type. With this, our highest Geometrid, I would commence the family. Dr. Packard begins with the lowest genera. The Brooklyn "Check List" is, in the main, a transcription of Packard, and, in this family, reverses its ordinary procedure, which is to commence with the supposed highest genera and end with the lowest.

Tetracis Lorata Gr. Proc. Ent. Soc. Phil., 3, 91, 1864.

This is a well known insect, the most simply marked and delicately colored of the genus, and also one of our largest species. The larva is described by Mr. Goodell, Can. Ent. 9, 62. It was found on the Sweet Fern (*Comptonia Asplenifolia*). The moth is figured in Dr. Packard's Monograph. Unless the types are in the Philadelphia collection, I do not know where they now are, the species being described so long (eighteen years) ago. It is of little consequence, as there is no doubt about it.

Tetracis Coloradaria G. & R., Ann. N. Y. Lyc. Nat. Hist., vol. 8, 1767, pl. 2, fig. 11, ♀.

Dr. Packard figures the ♂, plate 12, fig. 47, and refers the moth to *Tetracis*. The original figure is colored. The type may be in the Central Park collection, and is then probably injured, as the "Grote & Robinson" collection, deposited there, has had little attention. There is no doubt as to the species, which is not rare in Western collections.

Drepanodes Puber G. & R., Ann. N. Y. Lyc. N. Hist., vol. 8, 1867, pl. 1, fig. 1, ♂.

The original figure is colored. The type in my collection. Dr. Packard keeps our name, but the Brooklyn Check List puts *aria* after it quite unnecessarily. Dr. Packard figures the ♂, plate 12, fig. 35. I do not know the female.

Drepanodes Sesquilinea Grote.

Dr. Packard figures the ♂ under the name *varus*, plate 12, fig. 36.

The ♂ type is in my collection from Alabama. Dr. Packard says: "A careful examination convinces me that the males which I had heretofore regarded as distinct from *varus* (labelled *sesquilinea* by Mr. Grote) are really the males of *D. varus*, of which heretofore we have only had the females."

Drepanodes Varus G. & R., Ann. N. Y. Lyc. N. Hist., plate 15 A, fig. 2, ♀.

The type, with that of *aquosus*, was not returned by Dr. Packard to my recollection. The original figures of both are colored. They are regarded as forms of one species by Dr. Packard, who refers his *Funiperaria* as synonymous. I have little doubt that Dr. Packard is entirely correct and that we have to do with a single variable species, which Dr. Packard calls *Varus*, and which has received four names. The Brooklyn "Check List" calls the species "Varia," which is entirely inaccurate, the two words being quite distinct.

Endropia Vinosaria G. & R. Ann. N. Y. Lyc., pl. 15 A, fig. 4.

Identified by Dr. Packard with Mr. Walker's *Madusaria* and *Oponearia*; probably also described by him as *Astylusaria*. We had previously published the same facts, Tr. Am. Ent. Soc. 1868, p. 15, after our visit to the British Museum.

Endropia Arefactaria G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 7.

Larger than *Amoenaria*, of which in the Philadelphia collection I determined specimens. Considered the same by Dr. Packard. I am of the opinion that it is a variety, but not strictly the same as Gueneé's species, which is smaller and brighter. I do not think that Dr. Packard has seen the exact equivalent of Gueneé's species because (as I recollect) the Philadelphia specimens agreed fairly with his figure, while Dr. Packard says his material does not agree with Gueneé's figure, but perfectly with his description. Dr. Packard's figure is *Arefactaria*, agreeing with ours.

Ellopia Bibularia G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 8, ♂.

Ellopia Pellucidaria G. & R., Ann. N. Y. Lyc., pl. 15 A, fig. 9, ♀.

Identified as sexes of one variable species by Dr. Packard and as previously described by Walker as *Ellopia seminudaria*. Dr. Packard says: "If I had had Mr. Grote's types alone of *bibularia* ♂ and *pellucidaria* ♀, I should have regarded them as distinct; but with the addition of other specimens of both sexes, I have felt compelled to unite them."

Our figures were colored and give a good idea of the species. I have not seen the types since they were sent to Dr. Packard ; but they are now of relatively little importance.

Ellopia Endropiaria G. & R., Ann. N. Y. Lyc. N. H., pl. 15 A, fig. 10, ♀.

This distinctly colored species may be known by the greater number of transverse lines and the strong angulation of the hind wings. Our figure is colored. The type may be in the Central Park collection. There can be no confusion as to the species.

Eucaterva Variaria Grote.

This insect seems allied to *Caterva Catenaria*. The long linear black and white palpi, shorter in the female, are peculiar. It has the appearance of a *Cleoria*. Black and white. The male has a curved extra-basal and a straight outer median blackish band, and discal mark on fore wings. Ground white. The females are of two sorts ; one white with sparse black dots over costa at base and collar, and along external margin, and singly elsewhere ; the other has the middle of the wing dead black. Fringe spotted. Body white. Hind wings white, dotted or irrorate. Beneath the same. Collected in Arizona ; collection of Mr. B. Neumoegen, who has a magnificent collection of *Lepidoptera*, in many respects the finest private collection I have had the opportunity to look over. The European genus *Zerene* does not occur in our fauna.

Chloraspilates Arizonaria Grote.

I have relied on the pale antennal stem, the minute annular discal marks and the obsolete t. p. line, to separate these from the Texan material described by Dr. Packard. Collection of Mr. B. Neumoegen. I am surprised that neither this genus nor *Stenaspilates* are acknowledged by the Brooklyn "Check List." They have many exclusive characters.

Plagodis.

Two species differ by the wider wings being fuller at external margin without the lower excision ; the margin is angulate at the middle. In *P. Floscularia*, the short, broad palpi do not exceed the front. The male antennæ are stoutly bipectinate. The front is rather broad and subquadrate between the naked eyes. The tibiæ are not swollen. The hind wings are rounded and wide. In the shape of the fore wings there is a resemblance to *Antepione*, but they are sharper at apices, and, above all,

longer in this, not unlike typical *Plagodis*. *Floscularia* is of a brilliant yellow color, without inner line on fore wings ; the outer line vague, nearly straight. There is an apical red-brown dot ; the outer line red-brown on costa, followed by a pinkish-violet patch at internal angle. Hind wings concolorous, hardly paler yellow with linear patch at anal angle. A tender pinkish-violet shade on costa of fore wings above ; at base marked costally with dark brown. Body yellow ; face pinkish. Venter reddish-pink. Beneath also yellow with markings repeated. The ♀ type of *Floscularia* is in the collection of Mr. G. R. Pilate.

Plagodis Rosaria G. & R.

This species is figured by Dr. Packard as the *Epione Serinaria* of Gueneé, and referred to *Plagodis*. Our name for the insect was distributed now many years ago. One unset and somewhat defective type in my collection. Others must be in Central Park or in collections of correspondents. The species was named by us in 1867 or thereabouts. This insect is ochrey yellow and purely pink, not lilac or violet tinted, and without the red apical mark of *Floscularia*.

Nematocampa Expunctaria Grote.

Dr. Packard refers this to *Filamentaria*, without knowing my type from Alabama. This type is either in Philadelphia or in the Peabody Museum, Salem, to the best of my recollection. The texture of the wings seemed to me different, less smooth, closer and heavier than its ally. It appeared to me a decidedly distinct and a little larger species. I believe when the type is examined that it will be found a different species from *Filamentaria*, but as I have not met it again, I am unable to add anything to my original description, CAN. ENT., iv., 101, 1872.

Heliomata Grote.

Of the three lovely species belonging to this genus, *Infulata* and *Cycladata* are figured by Dr. Packard, and I have seen several specimens of them since originally figuring and describing them in the "Proceedings of the Entomological Society of Philadelphia." But the third, *Elaborata*, I have not seen again. The type is, I believe, in Philadelphia ; I think my figure and description will serve to identify the species. The species of this genus are probably more or less active by day. They seem to be quite rare, for I have seldom met them in collections. I think I have seen *Cycladata* oftener than its ally. I have never been fortunate enough to find them myself.

Byssodes Obrussata Grote.

I have followed M. Gueneé's terminations in this tropical genus. Our Florida species seems allied to *Paradoxata*, but Gueneé does not mention the basal ochre metal-margined line; the third band at the middle is not marked with a "cellular spot" and I should not call the wings "narrow and elongated"; our species is also larger. There seems to be a number of species very similar; and, perhaps, geographical races rather than species. With *Racheospila cupedinaria*, this species from Indian River shows that the *Geometridæ* of South Florida are allied to those of the West Indies. The same fact is exhibited by the representatives of other families of Lepidoptera.

A PHYSIOLOGICAL ARRANGEMENT OF INSECTS.

BY A. H. SWINTON, GUILDFORD, ENGLAND.

Extracted from The Entomologist, vol. xi., p. 255; and Yorkshire Naturalist, vol. vii., p. 45; with author's revision.

Having in times gone by perused with interest certain essays from the pen of the late Edward Newman on the subject of a true or physiological arrangement of Insecta, may I now be allowed to call attention to the additional evidence adducible from the recent investigations of their organs of sensation, a matter I had lately the honor of placing before public attention in my book, *Insect Variety*.

Viewed in this new light, the presence of auditory organs and well-developed eyes place the Orthoptera first in this list; and these would be followed by a group of the Homoptera, the *Cicadidæ*, where we find the auditory organs are highly developed, but sight less potent. Next to these appear to come Lepidoptera, where the *Nocturni* stand first as having well-defined auditory organs, and the *Diurni* second from reason of their excellent optic organs. Then would follow Coleoptera, which as far as Europe is concerned, certainly give evidence of possessing auditory apparatuses in two of their groups, the *Lamellicornia* and *Longicornia*, although in the latter the visual organs are imperfect. As far as I can learn, the species of Hymenoptera, Neuroptera and Diptera, have the

auditory sense, if present, much less potent ; but sight, smell and touch are evident and variously developed. This perfectly harmonizes with Newman's circular view, given in the Entomologist, vol. iv., p. 236.

Next, it has been a long standing practice with the authors of works on British Butterflies to treat of the five groups represented in these islands in the following order : *Papilionidæ*, *Nymphalidæ*, *Erycinidæ*, *Lycenidæ* and *Hesperidæ* ; but since the first family has close affinity with the last, according to Dr. Scudder and others, the method is only plausible on the principle of extremes meeting ; the better arrangement every way being this, *Nymphalidæ*, *Erycinidæ*, *Lycenidæ*, *Papilionidæ* and *Hesperidæ*. Then if physiological reasons could ever be got to prevail over the fancy for having the butterflies first, I would likewise suggest a further arrangement of five groups of moths, showing the development of that structure at the base of the abdomen I attribute with the faculty of hearing, the highest of insect senses, thus : *Noctuina*, *Bombycina*, *Geometrina* and *Sphingina*. Between the *Geometrina* and *Sphingina* come as I consider the butterflies, springing from either group in the species of *Urania* and the *Hesperidæ* respectively. At the best, however, must it appear that any such linear system is to be inferior to the Darwinian method of a theoretical descent, for if lines are not to meet somewhere, what can be made out of case-bearing *Bombycina*, and case-bearing *Tineina* that harmonize like the species of *Incurvaria* ; and why is our ghost moth such a strange anomaly ? One warm, still evening at the commencement of July, 1881, wandering out butterfly net in hand to watch for the comet to appear over our chalk hill, I came on a spot where an elder bush stood clearly defined against the full harvest moon, over whose ivory blossoms several males of this moth were dancing sideways, little fans full of whimsicality glowing in the dusk like whiting on the hook or calico caught by the sunshine. It was a beautiful and saintly apparition, that held me long before courage was mustered sufficient to catch a couple for the cabinet. Two ghosts however were eventually boxed, and as I spread these out on the setting board I became much struck by the circumstance how little they gave me the idea of a moth, and how little they harmonized with the moths of the group to which they are accredited. Their four wings all alike, wanting the hook and eye to link them, suggested most those of a dragon-fly, and seemed to point to a greater development of the mesothoracic muscles to sustain their increased exertion. Their expansile fans on their hinder femora, and their subterranean larvæ, brought one back to the owl moths

of the Brazils and the red under wings of the genus *Catocala*; which in their great wing expanse, semi-looping caterpillars, and scent pencils, bridge over the gap between the *Noctuina* and *Geometrina*. Yet as their wings want the *hook*, so do their *fans* want the *pouch* that conceals them in these moths. Indeed the ghost moths, and the family of the *Hepialidæ* to which they belong, want so many of those characters that characterize lepidoptera, that one is led on to the supposition that their progenitors never acquired them; and they belong to an older race, that in time past has disseminated itself from Europe to the antipodes of the Maories. Other races, as the species of *Psychidae* and *Coleophora*, whose distribution is equally great, are in their economy scarcely indeed less curious; and the worm-like females of the first, sitting on their caddis-cases composed of straws, bring us very low down indeed in the scale of insect organization and adaptation, while they seem at the same time to transport us back in geological time.

ENTOMOLOGY FOR BEGINNERS.

THE GREAT LEOPARD MOTH—*Ecpantheria scribonia* Stoll.

BY THE EDITOR.

The larva of this insect is comparatively abundant in the autumn throughout most of the Northern United States and in many parts of Canada. It is found feeding on various species of plants, but most commonly on the wild Sunflower, *Helianthus decapetalus*. It is about two and a half inches long, with a shining black head shaded with reddish on the sides, and a brownish black body. Each segment has an irregular transverse row of tubercles from which spring tufts of rigid shining black hairs, while the spaces between each segment from the fourth to the tenth inclusive are banded with red, the bands being widest and most conspicuous from the sixth to the ninth inclusive. These bands are a striking feature in the appearance of the caterpillar, especially when it is coiled up as shown in figure 12 (after Riley). The color of the under side varies

from reddish to yellowish brown, feet reddish, prolegs brown, thickly clothed with short hairs.

This larva attains its full growth in the autumn and hibernates during the winter under logs, the loose bark of decaying trees, or other suitable hiding places. By the genial warmth of spring it is aroused from its torpid condition and feeds for a few days upon grass, or almost any other green thing it may meet with. It then constructs a loose cocoon, within which it enters the chrysalis state.

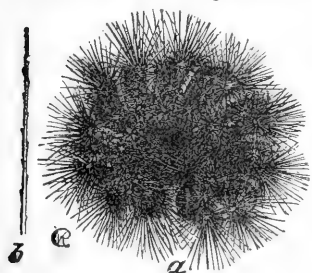


Fig. 12.

The chrysalis is black with a beautiful bloom on its surface, which is easily rubbed off; it has a flattened projection at its hinder extremity, which is tipped with a few bristles.

After remaining about a fortnight in the pupa state, it appears as a unique and very beautiful moth. In figure 13 (after Riley) *a* represents

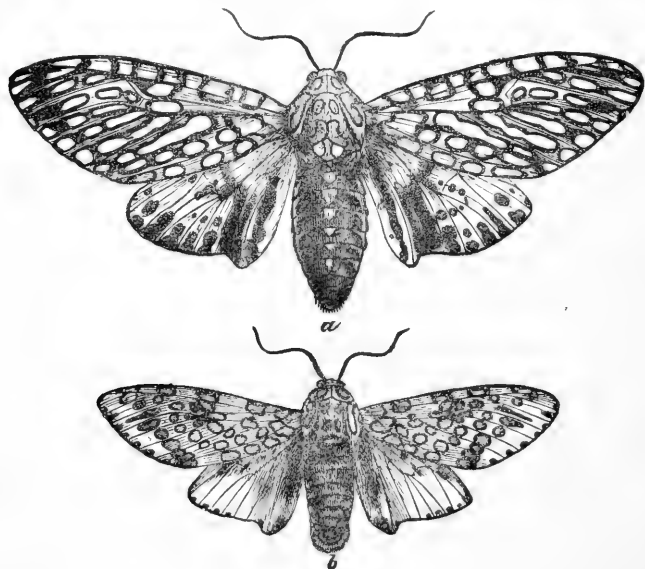


Fig. 13.

the female, *b* the male. The wings are white, ringed, streaked and spotted with dark brown as shown in the figure. The thorax has ten or twelve

black spots with a bluish white centre; the upper portion of the body is steel blue, streaked along the middle and sides with yellow or orange; legs white, ringed with black at the extremities. The male differs from the female mainly in his smaller size and narrower abdomen.

PROFESSOR FERNALD'S SYNONYMICAL CATALOGUE OF
NORTH AMERICAN TORTRICIDÆ.

BY A. R. GROTE.

The reader of the CANADIAN ENTOMOLOGIST will recall the first paper on the *Tortricidæ*, by Professor Fernald, who has been kind enough to send me advance sheets of his Catalogue of the Family now being published in Philadelphia.

At the time when Professor Fernald commenced his studies he paid me the compliment of asking my advice as to the group of Lepidoptera he should work upon. In advising him to take the *Tortricidæ*, I was influenced by my belief in his patience and scientific ability. No family of Lepidoptera which I have studied, except perhaps the *Phycidæ*, are as difficult as the *Tortrices*, or call for more diligent examination and careful manipulation. I had been bringing together material for a study of the *Tortricidæ*, and had described a few species and the genus *Phaccasiophora*, when Professor Fernald wrote to me. I was thus in a position to be of the slight assistance which Professor Fernald has, I am afraid, overestimated in his original paper alluded to above. But it is difficult to overestimate the importance of Professor Fernald's work and the excellence with which it has been performed. With the valuable aid of Lord Walsingham, Professor Fernald was able to examine personally almost every one of Mr. Walker's types. The types of my friend, the late Mr. C. T. Robinson, had been placed in Professor Fernald's hands before his visit to London, and I had given him all the material brought together by myself, so that no one was in so favorable a position for ascertaining what had been described and what was yet new among our *Tortrices*. Every American paper which I have seen on the family, since that time, has been issued after the material on which it was based had been determined

by Professor Fernald, who is our authority on the *Tortricidæ* without a rival. And this position is not an easy one to gain. The little delicate insects are very variable, and in the genus *Teras*, for instance, they change pattern and colors like a kaleidoscope. The genera, as in the Deltoids, Phycids, etc., have to be limited by characters offered by the males alone, quite often, and in all cases the entire structure has to be carefully noted in order to locate the species to the best advantage.

All the requirements have been met, and, as a proper conclusion to his labors so far, a breathing place where one can survey the road travelled over, Professor Fernald gives us his very useful *Catalogue*. Having ourselves written a synonymical Catalogue of the *Sphingidæ*, we have a lively sense of the work to be performed in a Family yet more numerous in species and more intricate in synonymy. The student can, however, use Prof. Fernald's Catalogue with the certainty that it is as accurate as it can be made, and he will be very unappreciative if he feels no gratitude to its accomplished author, who has spared no labor in completing his self-imposed task. Professor Fernald, by his moderate views and careful methods, has proved himself a safe guide; at the same time he has shown himself possessed of talents which carry him easily in the front rank among living Entomologists. It would be well if such proofs as Professor Fernald has offered of knowledge of the subject were demanded of all writers of Lists and Catalogues; but I will not pursue this view of the subject any further, nor burden a proper praise of Professor Fernald with remarks which he is too amiable to sanction.

MR. S. H. SCUDDER'S NOMENCLATOR ZOOLOGUS.

BY A. R. GROTE.

Science is much indebted to Mr. Scudder for a great deal of very dry and tiresome work in the preparation of Catalogues. We have already from his pen a list of the generic names used for Butterflies, and now in a thick octavo volume of 376 pages we have a "list of generic names employed in Zoology and Palaeontology to the close of the year 1879, chiefly supplemental to those catalogued by Agassiz and Marschall, or indexed in the Zoological Record."

The list is beautifully and clearly printed and the proof reading has been exceedingly careful. After having gone over a number of names and after spending some hours with the book, I have found but one error of spelling. The labor of compiling the list has been evidently great, and Mr. Scudder speaks of it in terms which shows how arduous it really was. The author was helped by those to whom he applied for lists of the generic names proposed by them, however, and Prof. Marsh went to the trouble of printing the references to his own numerous genera.

The list can hardly be thoroughly tested by any one student, who can only be expected to know his own genera and those of others in his specialty. In the *Noctuidæ* and the Moths generally I find a larger number of omissions than I should have expected. In the Butterflies I find no reference to the genus *Feniseca*, a name used by Mr. Scudder and all who have written on *Tarquinius* since it was proposed. I also find two mistakes which should not have been made. The genus *Euclemensia* is given as = *Hamadryas* of Boisduval, whereas it was proposed for *Hamadryas* of Clemens, preoccupied by Boisduval and Hübner. Also the genus *Copablepharon* is credited wrongly to me, and the original citation for *Argyrophytes* is not given. If these are fair samples of the reliability of the work, it would be wrong to praise it and its usefulness might be considered doubtful. It is probable, however, that the intention was not to give all the genera (as they have not, I think, been all collated out of the books of which Mr. Scudder gives a list), and the mistakes above pointed out may be exceptions. Of this each student will be able to judge, and it would be well for the work to be publicly examined by different scientists and the mistakes pointed out before Mr. Scudder publishes again on the subject.

The error of spelling alluded to above is on page 130, where *Eufitchia* is written *Eufichia*. It will be of course impossible to get all the names, but about twenty-five names proposed for genera of *Lepidoptera* which I looked for, I could not find in the List. These names were published within twenty years up to 1880. This number is very likely less than the real omissions of names for genera in the order *Lepidoptera*. There has been probably too great reliance placed on the contributions of authors, at the expense of personal research. We cannot suppose that there has been any private influence brought to bear on a compilation of this character, but there has been an effort to display very fully the generic names of certain authorities, while the genera proposed by those who have not

written much are apparently neglected. But it is precisely such genera which should be brought together in a work of this kind. A number of genera of which it may with confidence be predicted that they will never come into use, are cited, while genera now in constant use are omitted.

BOOK NOTICES.

Bulletin No. 7. Insects Injurious to Forest and Shade Trees, by A. S. Packard, jr., M. D. Issued by the Department of the Interior, U. S. Entomological Commission.; 8vo., pp. 275, with 100 illustrations.

The object of this Bulletin, as stated in the introduction to it, is to give to the public a brief summary of what is up to this time known of the habits and appearance of such insects as are injurious to the more useful kinds of trees. Beginning with the insects injurious to the various species of Oak, the author treats of those which injure the Elm, Hickory, Butternut, Chestnut, Locust, Maple, Poplar, Linden, Birch, Beech, Tulip Tree, Horse Chestnut, Wild Cherry, Ash, Alder, Willow, Pine, Spruce, Balsam, Juniper, Tamarack, Arbor Vitæ, and others. A large proportion of the work is occupied with descriptions of those insects which injure the more important forest trees, such as the Pine and Oak. This is a most useful synopsis of our knowledge in this department, and its issue will no doubt greatly stimulate the progress of Entomology in this practical direction, for while it shows that much has been done in some of the most important departments, in many others our knowledge is extremely scanty. This work is conveniently arranged, and like the other works of this distinguished author, well written in a plain and popular style, and will commend itself to all who are interested in preserving our forests and useful shade trees from destruction by insect foes.

(A Fragment of a) Guide to Practical Work in Elementary Entomology. An outline for the use of students in the Entomological Laboratory of Cornell University, by J. Henry Comstock; 8vo., pp. 35.

This work is divided into two chapters, the first of which treats of the terms denoting the position and direction of parts in insects, the second of the external anatomy of a grasshopper, *Caloptenus femur-rubrum*. A useful guide to all those entering on the study of Entomology.

Tenth Report of the State Entomologist of the Noxious and Beneficial Insects of the State of Illinois, by Cyrus Thomas, Ph. D., 8vo., pp. 244, illustrated with two plates and 79 wood-cuts; containing articles on the Army Worm, *Leucania unipuncta*; a new Corn Insect, *Diabrotica longicornis*; the Relation of Meteorological Conditions to Insect Development; Descriptive Catalogue of Larvæ; the Larvæ of Butterflies and Moths; and the Hessian Fly. This Report contains much that is new in reference to these several subjects, and is a valuable contribution to Entomological literature.

A Bibliography of Fossil Insects, by Samuel H. Scudder, 8vo., pp. 47, being a complete list up to the present time of all known works and papers on fossil insects, arranged in alphabetical order.

Synopsis of the Catocalæ of Illinois, by G. H. French, Carbondale, Ill., containing references to fifty-eight species, followed by instructions for capturing Catocalæ, 8vo., pp. 11, with one wood-cut.

CORRESPONDENCE.

In reply to Mr. John Smith's remarks upon *Capis*, I would state that every student ought to know that in the Deltoids the eyes are always naked, the tibiæ unarmed. It was not necessary to recapitulate characters common to the Group. As I have given a large number of generic descriptions and reviewed in different papers and works the structure of the *Noctuidæ*, for the past twenty years, I think it probable that I gave all the necessary characters, for the moment at least, until the male is discovered, to establish the genus. In the Deltoid *Noctuidæ*, as in the Phycids and Tortricids, sexual structure is of generic value. It is very easy now for Mr. John Smith to have his *Noctuidæ* named, and in response to a private letter from him, I offered to name his material more than a year ago. I am glad he seems to be studying the group, and I shall be happy at any time to name his material and afford him any information in my power. I think if he had applied to me I should have been able to give him the facts as to *Capis* and the Deltoid genera which would have rendered his article unnecessary. For, the structural details mentioned in Mr. John Smith's letter, cited in the paragraph before the last, and for not giving which in connection with *Capis*, I am blamed, are uniform throughout the North American Deltoids so far as I have observed.

A. R. GROTE.

NOTE ON PAPILIO POLYDAMAS, LINN.

In the Revised Synopsis of Species, commenced in Part 10, Vol. 2, But. N. A., I struck out *Polydamas*, *Villiersii* and *Serion*, for want of authentication. I believe these species have been credited to our fauna on authority of Dr. Boisduval, but if examples of either have been taken within the U. S. during the last twenty-five years, and up to the printing of my Revision, I am not aware of it. However, within the last two months, Dr. Wittfeld, of Indian River, Florida, has taken half a dozen *Polydamas*, one of which he sent me for identification. Although collecting butterflies assiduously for two years past, Dr. Wittfeld had not observed this species before. The larva, according to Boisduval, feeds on *Aristolochia*. *Serion*, Fabr., is a Jamaican species, and is not likely to have been seen in Florida. *Zonaria*, Butler, = *Serion*, Cramer, is Cuban, and may be also Floridian, but until properly authenticated, I should reject it.

NOTE ON CHIONOBAS TARPEIA, ESPER.

I have recently received from Dr. Staudinger six Siberian examples of this species, showing variation, and am satisfied that I myself have seen nothing American which can be called *Tarpeia*. It resembles on upper side C. *Uhleri*, but differs widely on under side. Mr. Butler, in Cat. Satyr., credits *Tarpeia* to Arctic America, and of course his authority decides that question, as he had the British Museum example before him.

W. H. EDWARDS.

A NEW VARIETY OF CATOCALÆ.

Catocala Paleogama Guen.

N. Var. *Annida*.—The whole of the posterior margin, nearly to the middle, of the primaries brownish black. The terminal space brownish gray with a light shade across the middle. The white marking along the *t. p.* and *t. a.* and subterminal lines very prominent.

In the more common form the whole wing is pale brownish gray, except the reniform and subterminal space, from which this var. may readily be distinguished.

This var. is to *Paleogama* what var. *Evelina* is to *Lachrymosa*.

I have made my description from three male specimens.

D. B. FAGER, Carbondale, Illinois.

The Canadian Entomologist.

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No. 7

THE GRAPE PHYLLOXERA—*Phylloxera vastatrix*.

BY THE EDITOR.

This tiny but formidable foe to the grape vine, which has during the past few years attracted so much attention in Europe and America, has appeared in its worst form, viz., the root-inhabiting type, in Ontario, and is doing a considerable amount of damage in our vineyards. Early this spring the writer received from Mr. A. H. Pettit, of Grimsby, samples of fibrous roots from diseased vines, which had every appearance of being affected by the Phylloxera, but the specimens received were so dried up that if there had been any lice on them they could not be discovered. Request was made for fresh specimens in moist earth, but none were obtained.

On the 19th of July, in company with Mr. J. M. Denton, of London, I visited the vinery of Mr. Richard Stephens, in Westminster, about a mile from London, where we found a number of Concord vines growing in heavy clay soil, which were suffering much from some cause; the foliage had become very yellow and some of the vines appeared to be dying. On examining the roots we could find but few living, and the fibrous roots were covered with the little knotted swellings so characteristic of Phylloxera. On digging around some vines that were less diseased, a number of the lice were discovered on the young, fresh roots, puncturing them, imbibing their juices, and causing disease and death.

On the day following we visited our own vinery, on sandy soil, near London, and detected the same form of disease, but much less pronounced, on Rogers' 15 and some seedlings.

On examining the roots Phylloxera were found in their different stages of egg and larva of various sizes, in comparative abundance. In the case of Mr. Stephens the insects must have been at work for several years to have caused the extent of injury which we saw, but in our own case the invasion is probably a more recent one. We are glad to state that on Mr. Stephens' grounds we found the small mite, *Tyroglyphus phylloxera*, which

feeds upon the Phylloxera and destroys it, associated with the lice and busy in its useful mission.

Since this insect is now known to be at work in Ontario, and probably to a greater extent than we are at present aware of, a condensed account of its life history will probably be interesting to our readers. The figures are from Prof. Riley's excellent reports, and the facts given mainly gleaned from the writings of this and other authors.

Its progress in Europe has been most alarming, inflicting untold losses in the wine making districts. The destruction it has occasioned in France has been so great that it has become a national calamity which the Government has appointed special agents to enquire into; large sums of money have also been offered as prizes to be given to any one who shall discover an efficient remedy for this insect pest. At the same time it has made alarming progress in Portugal, also in Switzerland and some parts of Germany, and among vines under glass in England. It is a native of America, from whence it has doubtless been carried to France; it is common throughout the greater portion of the United States, and in one of its forms in Canada, but our native grape vines seem to endure the attacks of the insect much better than those of Europe. Recently it has appeared on the Pacific slope in the fertile vineyards of California, where the European varieties are largely cultivated, and hence its introduction there will probably prove disastrous to grape culture.

This insect is found in two different forms: in one instance on the leaf, where it produces greenish red or yellow galls of various shapes and sizes, and is known as the type *Gallaeicola*, or gall-inhabiting; in the other and more destructive form, on the root, known as the type *Radlicola*, or root-inhabiting, causing at first swellings on the young rootlets, followed by decay, which gradually extends to the larger roots as the insects congregate upon them. These two forms will for convenience be treated together.

The first reference made to the gall-producing form was by Dr. Fitch in 1854, in the Transactions of the New York State Agricultural Society, where he described it under the name of *Pemphigus vitifoliae*. Early in June there appear upon the vine leaves small globular or cup-shaped galls of varying sizes; a section of one of these is shown at *d*, figure 15; they are of a greenish red or yellow color, with their outer surface somewhat uneven and woolly. Figure 14 represents a leaf badly infested with these galls. On opening one of the freshly formed galls, it will be found to

contain from one to four orange colored lice, many very minute shining,



Fig. 14.

oval, whitish eggs, and usually a considerable number of young lice, not much larger than the eggs and of the same whitish color. Soon the gall becomes over-populated, and the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves either on the same leaf or on adjoining young leaves, where the irritation occasioned by their punctures causes the formation of new galls, within

which the lice remain. After a time the older lice die, and the galls which they have inhabited open out and gradually become flattened and almost obliterated; hence it may thus happen that the galls on the older leaves on a vine will be empty, while those on the younger ones are swarming with occupants.

These galls are very common on the Clinton grape and other varieties of the same type, and are also found to a greater or less extent on most other cultivated sorts. They sometimes occur in such abundance as to cause the leaves to turn brown and drop to the ground, and instances are recorded where many vines have been defoliated from this cause. The number of eggs in a single gall will vary from fifty to four or five hundred, according to the size of it; there are several generations of the lice during the season, and they continue to extend the sphere of their operations during the greater part of the summer. Late in the season, as the leaves become less succulent, the lice seek other quarters and many of them find their way to the roots of the vines, and there establish themselves on the smaller rootlets. By the end of September the galls are usually deserted. In figure 15 we have this type of the insect illustrated; *a* shows a front view of the young louse, and *b* a back view of the same; *c* the egg, *d* a section of one of the galls, *e* a swollen tendril; *f*, *g*, *h*, mature egg-bearing gall lice, lateral, dorsal and ventral views; *i*, antenna, and *j* the two-jointed tarsus.

When on the roots the lice subsist also by suction, and their punctures result in abnormal swellings on the young rootlets, as shown at *a* in figure

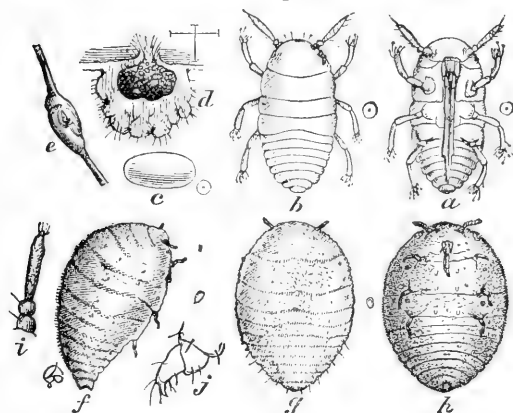


Fig. 15.

In figure 16 we have the root-inhabiting type, *Radiciola*, illustrated; *a*, roots of Clinton vine, showing swellings; *b*, young louse as it appears when hibernating; *c*, *d*, antenna and leg of same; *e*, *f*, *g*, represent the more mature lice. It is also further illustrated in fig. 17, where *a* shows a healthy root, *b* one on which the lice are working, *c* root which is decaying and has been deserted by them; *d* *d* *d* indicates how the lice are found on the larger roots;

e, female pupa seen from above, *f* the same from below; *g*, winged female, dorsal view; *h*, the same, ventral view; *i*, the antenna of the winged insect; *j*, wingless female laying eggs on the roots, while *k* indicates how the punctures of the lice cause the larger roots to rot. Most of these figures are highly magnified; the short lines or dots at the side showing the natural size.

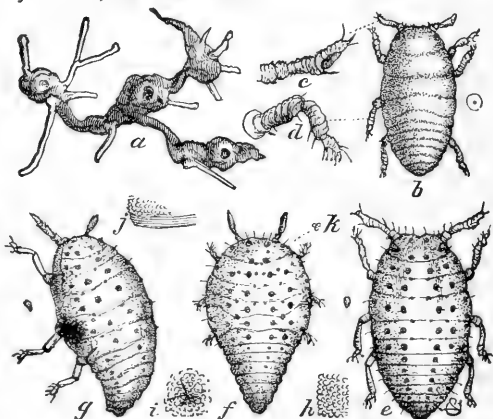


Fig. 16.

During the first year of the insect's presence the outward manifestations

of the disease are very slight, although the fibrous roots may at this time be covered with the little swellings; but if the attack is severe, the second year the leaves assume a sickly yellowish cast, and the usual vigorous yearly growth of cane is much reduced. Eventually the vine usually dies,

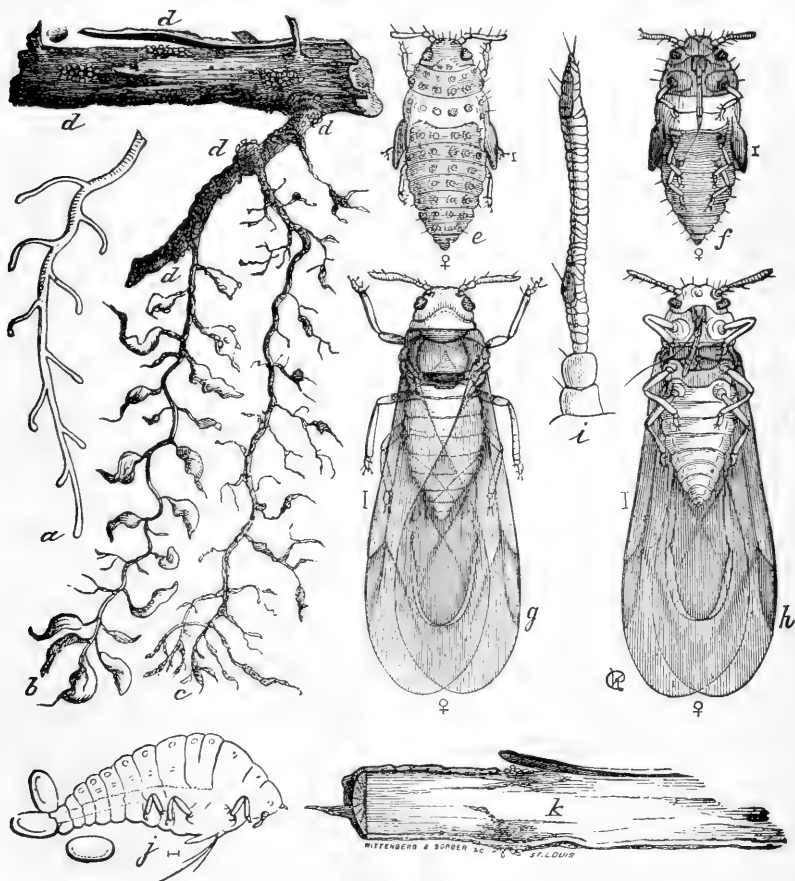


Fig. 17.

but before this takes place, the lice having little or no healthy tissue to work on, leave the dying vine and seek for food elsewhere, either wandering underground among the interlacing roots of adjacent vines, or crawling over the surface of the ground in search of more congenial quarters.

During the winter many of them remain torpid, and at that season assume a dull brownish color, so like that of the roots to which they are attached, that they are difficult to discover. They have then the appearance shown at *b* in figure 16. With the renewal of growth in the spring, the young lice cast their coats, rapidly increase in size, and appear as shown at *e*, *f*, *g*, in the figure ; soon they begin to deposit eggs, these eggs hatch, and the young shortly become also egg-laying mothers like the first, and like them also remain wingless. After several generations of these egg-bearing lice have been produced, a number of individuals about the middle of summer acquire wings. These also are all females, and they issue from the ground, and rising in the air, fly or are carried with the wind to neighboring vineyards, where they deposit eggs on the underside of the leaves among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. Occasionally individual root lice abandon their underground habits and form galls on the leaves.

The complete life history of this insect is extremely interesting and curious, and those desirous of further information as to the different modifications of form assumed by the insect in the course of its development, will find them given with much minuteness of detail in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by C. V. Riley.

Remedies : This is an extremely difficult insect to subdue, and various means for the purpose have been suggested, none of which appear to be entirely satisfactory. Flooding the vineyards where practicable seems to be more successful than any other measure, but the submergence must be total and prolonged to the extent of from twenty-five to thirty days ; it should be undertaken in September or October, when it is said that the root lice will be drowned, and the vines come out uninjured.

Bisulphide of carbon is claimed by some to be an efficient remedy ; it is introduced into the soil by means of an augur with a hollow shank, into which this liquid is poured ; several holes are made about each vine, and two or three ounces of the liquid poured into each hole. Being extremely offensive in odor and very volatile, its vapor permeates the soil in every direction, and is said to kill the lice without injuring the vines. This substance should be handled with caution, as its vapor is very inflammable and explosive. Carbolic acid mixed with water, in the proportion of one part of acid to fifty or one hundred parts of water, has also been used with advantage, poured into two or three holes made around the base of

each vine with an iron bar to the depth of a foot or more. Soot is also recommended, to be strewed around the vines.

It is stated that the insect is less injurious to vines grown on sandy soil ; also to those grown on lands impregnated with salt.

Since large numbers of these insects, both winged and wingless, are known to crawl over the surface of the ground in August and September, it has been suggested to sprinkle the ground about the vines at this period with quicklime, ashes, sulphur, salt or other substances destructive to insect life. The application of fertilizers rich in potash and ammonia have been found useful, such as ashes mixed with stable manure or sal-ammoniac.

A simple remedy for the gall-inhabiting type is to pluck the leaves as soon as they show signs of the galls, and destroy them.

Several species of predaceous insects prey on this louse.

A black species of Thrips with white fringed wings deposits its eggs within the gall, which, when hatched, produce larvæ of a blood red color, which play sad havoc among the lice. The larva of a Syrphus fly, *Pipiza radicum*, which feeds on the root louse of the apple, see figure 18, has also been found attacking the Phylloxera. Another useful friend is a small mite, *Tyroglyphus phylloxera*, P. & R., see fig. 19, which attacks and destroys the lice, and associated with this is sometimes found another species, *Hoplophora ardata*

Riley, of a very curious form, reminding one of a mussel. The lice are also preyed on by the larva of a Scymnus, a small dull colored lady bird ; also by several other species of the lady-bird family, and by the larvæ of lace-wing flies.

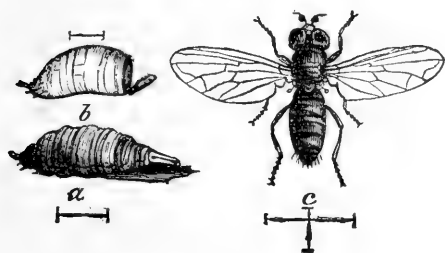


Fig. 18.

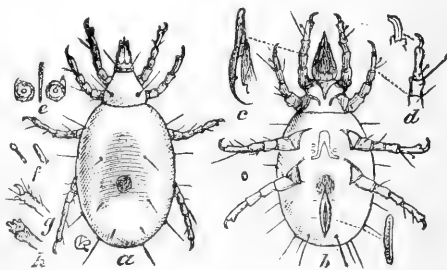


Fig. 19.

To guard against its introduction into new vineyards, the roots of young vines should be carefully examined before planting, and if knots and lice are found upon them, these latter may be destroyed by immersing the roots in hot soap suds or tobacco water.

Our native American vines are found to withstand the attacks of this insect much better than do those of European origin, hence by grafting the more susceptible varieties on these hardier sorts, the ill effects produced by the lice may in some measure be counteracted. The roots recommended to use as stocks are those of Concord, Clinton, Herbe-mont, Cunningham, Norton's Virginia, Rentz, Cynthiana, and Taylor. The Clinton, one of the varieties recommended, is particularly liable to the attacks of the gall-producing type of Phylloxera, but the lice are seldom found to any great extent on its roots, and the vine is so vigorous a grower that a slight attack would not produce any perceptible effects.

"EUDAEMONIA JEHOVAH"—A REVIEW.

BY A. R. GROTE.

The describer of species has accomplished his task when he has given the proper Latin names, but it depends largely on the one who catalogues the species, whether these names pass into use or not. In the work of preparing a "New Check List of North American Moths," I have gone over much of the literature bearing on the subject, and the following reflections have presented themselves to me.

In the first place, I have been actuated by a sincere desire to meet the views of the anti-Hübnerists, and avoid the use of old or objectionable names. Professor Riley has brought forward objections to the resuscitation of forgotten or neglected names, and others have written with the same object in view. I found, however, to my surprise, I must confess, that the best Catalogue, that of Staudinger, did not hesitate to introduce names out of use for almost a century; and this merely because they were a very little older than the name in common use. So prominent an insect as *Papilio Podalirius*, is made to appear as *P. Sinon*. And in the "Preface," the necessity for placing the synonymy on a firm basis is given as a reason for enforcing the rule of priority so rigidly. If this can be

done in Europe, where there exists so large an Entomological public, why should it not be done here, where that public is so limited? For instance, in the genus *Catocala*, I have reinstated *Grynea* of Cramer; but I hardly think that, before my paper appeared, the insect had any name at all in collections, or that the name of *nuptula*, which I rejected, was used to any extent. Outside of the difficulty of deciding what constitutes a name "in use," I think the science is yet so young with us, that no names have been used so much that their abandonment could lead to any confusion or trouble of moment. Certainly if such changes can be made in an important European Catalogue like Staudinger's, there can be no reason for the American Systematist being at all troubled at finding himself obliged to make them. And with the use of Hübner's genera, I find that proportionately more of such names are used by Staudinger than in the older lists of Boisduval, Heydenreich, Gueneé or the English writers, except, perhaps, Stephens. To the writers of the "Brooklyn Check List," I would, in fact, recommend the study of Staudinger's Preface. These writers profess, indeed, much veneration for Staudinger, and the writers whom they somewhat vaguely term "Continental Authors," and it is really worth while to ascertain fully what Staudinger says on this and kindred topics in his "Preface." I think that we can adopt this "Preface" as giving excellent judgment on all, or most of the moot points in nomenclature, and be guided by it. The practice of giving a specific name only once in a Family is discussed on page xviii of the "Preface." This is properly condemned, but it is rightly insisted upon that in two related genera the same specific name should not be used. And where a change has been made for this reason, the new name should be respected even if the species thus re-named should be removed to a quite different genus from the one under which it originally appeared, and where it was re-named to avoid a duplication of the first specific name. Thus I should keep *Puritana* Rob., instead of bringing into use again the original name for the species which was a duplication at the time.

I would, finally, modify the law of priority and not recognize such names as the one proposed by Mr. Strecker at the head of this article. There is only one objection to such names, that they offend the ears of many who are interested in the object they designate. On fair, "common sense" grounds, they should be rejected. And they have no excuse for appearing, since names are more plentiful than species. In the present case, the species should be catalogued under the name *Streckeri*, and no

reference be made to the original name, which has been used by Mr. Strecker "in vain."

It is not here a question of Orthodoxy, but of taste and decency. While great sacrifices are to be made to secure a stable nomenclature by the enforcement of the law of priority, there is a point where the proposer of objectionable names should meet with a check. Under cover of priority there is no telling how far we might be led, were we obliged to adopt any names that might be proposed. But no student is obliged to use names which appear to him disadvantageous to the comprehension of his subject or the general welfare of his science. The more he is interested about the fact and the less about names and rules, the better. At least he will not trouble himself to use an objectionable term for the sake of priority. And this is the strong point of the anti-Hübnerists. And it would be legitimate were it not shown that Hübner's names are mainly objected to from their being neglected, or insufficiently founded; there can be no reason, where they are well founded, for their further neglect, since their use makes but little trouble at present and what we need is a stable nomenclature. To attain this we must exhaust the application of names at present in literature.

PREPARATORY STAGES OF HOMOPTERA LUNATA, DRURY.

BY G. H. FRENCH, CARBONDALE, ILL.

EGG.—Diameter, .03 inch. Globular in shape, slightly flattened at the base, the apex having a punctured space but no depression; a series of longitudinal ridges from near the base, 20 of which reach the apical space. As these ridges are the same distance apart, there are between those reaching the apex several shorter ones, the number not noted. The depressions between the ridges show slight punctures. Color pale green. Duration of this period 5 days.

YOUNG LARVA.—Length .15 inch, slender, 12 legs, the first and

second pair of pro-legs mere points. A looper in motion. Color of the middle of the body from joint 2 to 11 pale dull yellow, with a slight leaden hue; head, joint 1 and the anal joint slightly reddish, these parts lacking the leaden hue. All the feet pale. Hairs arising from piliferous spots gray. Head about one third broader than the body. Duration of this period 3 days.

After 1st Moulting.—Length .20 inch. The whole of the dorsum pale green with traces of lines only on the thoracic and the posterior segments. On the sides two prominent reddish brown lines separated by a narrow green one. There is a very faint reddish subdorsal line. None of the piliferous spots are prominent except the posterior pair of the dorsal on joint 4, which are slightly enlarged and black. Head pale reddish brown mottled with darker. The first and second pairs of pro-legs a little more prominent. The larvæ are very active. Duration of this period 3 days.

After 2nd Moulting.—Length .55 inch. The general color of the dorsum is pale grayish green tinged with brown at the extremities. Dorsal line composed of two greenish white lines with a narrow space of the ground color between. Subdorsal line dull white. On the sides are three stripes separated by narrow white lines. The middle stripe is blackish brown considerably tinged with green on joints 4 and 5, and containing the stigmata. The other two stripes are paler with more green. The general color of head is brown, the stripes of the body extending irregularly over it, though considerably mottled. Feet pale brown. Piliferous spots black, the posterior dorsal pair of joint 4 prominent in color, a little so in elevation. Part of hairs from piliferous spots black, part brown. Venter gray with black spots in the middle of the joints. Duration of this period 4 days.

After 3rd Moulting.—Length .75 inch. The dorsal space is in three distinct stripes, separated by two white lines. The dorsal or central stripe has an imperfect faint dorsal line, the rest of the stripe being pale mottled with brownish. The stripe between this and the subdorsal is brown mottled with greenish. The sides striped much as in the last period, the stripes separated by white lines. The upper of the three is like the dorsal stripe, pale inclining to carneous; the second or stigmatal is like the one in the dorsal space. The stripes are a little darker on the thoracic joints than elsewhere. Piliferous spots black, the posterior dorsal pair of joint 4 prominent as before. The articulations or incisures of the joints in the

middle of the body incline to yellow. The brown and pale brown mottlings of the head, though irregular, seem to follow in a measure the stripes of the body in arrangement. Pro-legs concolorous with the body, thoracic paler. Venter dull white, black in the middle of the joints. Hairs black. Duration of this period, 3 days.

After 4th Moults.—Length 1.05 inches. Marked and colored very much as during the preceding period. Piliferous spots less prominent, except the posterior pair of joint 4. Each one of these contains a white dot with a similar dot in its front. Joint 11 a little raised with the posterior pair of spots tubercular. Duration of this period 3 days.

After 5th Moults.—Length 1.35 inches. The plan of marking of the insect has not changed, but the colors are so modified that the caterpillar has a yellowish brown appearance with a decided chrome yellow tint at the intersection of joints 4 and 5. The piliferous spots are black, but from joint 4 back each is accompanied by a small white spot. In general the piliferous spots have grown less prominent, the posterior on joint 4 about the same, those on joint 11 a little more elevated. The dorsal stripe is a little irregular in outline at the intersection of the joints, consisting of one or more expansions and contractions. The difference in color of the stripes seems to be due to the difference in shade of the brown dots of which the stripes are composed, the yellowish green ground color being about the same. Venter about the shade of the pale stripes, the middle of each joint being brownish black tinged with wine color, these spots being connected.

Mature Larva.—Length 1.45 inches. Width of head .12 inch, of middle of body .18. Head flat, sloping; ocelli 6; in shape and number of ocelli resembling larvæ of *Catocalæ*. Marked very much as at the beginning of this period, three stripes on the dorsum and three on each side, alternating light and dark, but these are less distinct, approaching a uniform brownish drab; the white spots also less distinct. The first and second pro-legs are about half the length of the others. Venter a little paler than above, with an elliptical reddish brown spot in the centre of each joint. Legs and palpi concolorous with the body, jaws dark brown. Duration of this period 13 days.

Chrysalis.—Length .80 inch, depth of thorax .25 inch; basal abdominal depression very slight. Depth of 4th abdominal joint .27 inch, from this gradually tapering to the end; the wing cases covering five joints in front, the legs and antennæ cases extending the same distance as the

wings. The tip of abdomen coarsely furrowed and punctured, terminating in two long hooks with several shorter ones arising from the corrugated surface a little way from these. These hooks are fastened in a button or piece of silk of considerable extent at the posterior end of the cocoon; the latter being composed of leaves fastened together, with or without being attached to the box, but not lined on the inside except the space of silk already mentioned. Anterior portion of chrysalis a little produced at the head, no particular organ projecting prominently. Color brown, not very dark, moderately glaucous. Duration of this period 18 days.

This gives a total time from depositing the egg to the imago of 52 days. I should say, however, that this season was very wet during the months of May and June, and after passing the 5th moult there were several days during which little food was taken and some of the larvæ died, they appearing to be affected by the wet weather. I should say further that the notes as to time of moult were taken from a few of the more healthy larvæ, several of them being more protracted in their time than the one given. The 13 brought through all their stages had periods as follows :

1 a period of 52 days.			2 a period of 55 days.		
2	"	56	1	"	57
1	"	59	1	"	60
2	"	61	1	"	62
1	"	65	1	"	70

The eggs were deposited April 30th, and the first moth hatched June 21st, the last July 10th. During former years I have found the larvæ of this species on willow and other bushes, and had them spin up the last of September and come out as moths the fore part of November. In other instances they passed the winter as chrysalids. From all the data given I should judge that there are from two to three broods during a season, according as the eggs are deposited by the early or late moths. All that I have wintered over hibernated in the pupa state, which is probably the usual if not the only method of hibernation.

On page 89 of vol. 9 of the CANADIAN ENTOMOLOGIST (1877) Mr. A. R. Grote mentions Mr. Hill, of Albany, N. Y., as authority for a statement that *Edusa* and *Lunata* are possibly sexes of one species. On page 174 of the same volume, Mr. Thomas E. Bean, of Galena, Ill., gives the result of some observations on specimens in his collection going to show that not only the two referred to, but *Saundersii*, should be included as well in

one species, those having white on the wings the males, and *Lunata* the female. On page 228 of the same volume, Mr. Bean again refers to the same subject, giving some additional evidence from observation of the imagines, going to show the correctness of the position taken. Since that time many have regarded the question as settled, though I find in the Check List recently published by the Brooklyn Entomological Society, the three names stand as three species, with *Nigricans* between *Saundersii* and *Lunata*.

The result of my rearing fully confirms all Mr. Bean claimed, as the following will show. From the one brood of eggs deposited by a single moth, form *Lunata*, *Lunata*, *Saundersii* and *Edusa* were obtained, and the forms were hatched in the following order: Numbers 1, 3, 9, 12 and 13 were *Lunata*; Nos. 2, 5, 6, 7 and 10 were *Edusa*; Nos. 4, 8 and 11 were *Saundersii*. As an evidence of sex the frenulum was examined in each specimen, and in all the *Lunata* it was double, but single in both the other forms.

This settles the question beyond any doubt, and reduces two of the forms to sexual varieties. I have not the works containing the original descriptions by me, and can not say for that reason which name has the priority, but shall leave that question to some one who has access to these works.

Knowing this species to be a general feeder from having reared it on maple and willow before, no effort was made to test its range of food plants, but it was fed most of the time on plum leaves.

ON A RECENT SPECULATION AS TO RANK IN INSECTA.

BY A. R. GROTE.

The reader will have noticed, in the June number of the CANADIAN ENTOMOLOGIST, a paper on the "Physiological Arrangement of Insects." The author there places the *Orthoptera* first in this list, owing to the presence of auditory organs and well developed eyes. The "arrangement" which follows is exceedingly "mixed," but the object of the present remarks is to point out that the author mistakes when he considers the presence of sense-organs as the crucial test of rank. And for this

reason, that, within the different Sub-orders, there is great variation in this respect. For instance, in the *Pyralidæ* we have forms almost identical, such as *Chryseudenton* and *Cataclysta*, which differ by the absence or presence of simple eyes. I do not wish to follow out the argument at length; the environment seems to effect comparatively easily the sense organs; Cave-insects are frequently blind. Again the Challenger Expedition brought up from the depths an eyeless Crustacean—*Willemoesia*, named for the distinguished naturalist, Dr. Willemoes-Suhm, who, unfortunately for science, died before the “Challenger” returned to her English dock. But insects *are* now “arranged” by their physiological characters, though certainly with very different results from those attained by Mr. A. H. Swinton. The whole structure and proportionate parts are taken into consideration, and little can be said against the observations, partly original, brought together by Dr. Packard in his “Guide.” And Mr. Swinton himself speaks of Dr. Scudder’s observations of rank in the Butterflies, not based on “sense organs,” and which seems to us so full and satisfactory. The observations on the “Ghost-moth” are an echo of Dr. Packard’s remarkable paper, in which the resemblance of *Hepialus* to the Neuropterous genus *Polystichoetes* was fully discussed. That the *Bombycidæ* afford instances of synthesis has been shown by this distinguished pupil of the elder Agassiz, who had so remarkable an ability for perceiving and weighing analogies and affinities in animals. The question of rank in insects goes hand in hand with that of the origin of the diverse forms. We fear that Mr. Swinton has but very partially examined the subject and that his suggestions as to sense-organs are not based on proper physiological studies. Not without a certain shudder can we read the author’s glib disposal of the question of rank in *Hexapoda*. And his use of sense organs to determine rank is open to the objection that it is not thorough; that some members of his highest groups will fall into the lowest, and thus utterly forsake their “physiological associates” by reason of a sudden failing of ears and eyes. “As far as I can learn” is hardly to be expected as the basis of observations seriously advanced; yet with these words our author disposes of “the species of Hymenoptera, Neuroptera and Diptera.” There is only one way to accumulate facts upon this subject, and that is to trace the changes in related forms, to take the dissecting needle in hand and to take down the numerous memoirs already extant upon the subject and thoroughly master their contents.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF
SCIENCE.

THIRTY-FIRST MEETING,

To be Held at Montreal, Canada, August, 1882.

The Thirty-first Meeting of the Association will be held at Montreal, Canada, commencing at 10 o'clock, a. m., on Wednesday, the 23rd of August, 1882; under the presidency of J. W. Dawson, LL. D., F. R. S., Principal of McGill University, Montreal.

The headquarters of the Association will be at McGill University, where members will register as soon as possible after arrival. The hotel headquarters will be at the Windsor.

The offices of the Local Committee and of the Permanent Secretary will be at the University. The General Sessions and the meetings of the Sections and Committees will all be held in the University buildings. The particular rooms will be designated on the programme for Wednesday.

Members expecting to attend the meeting are particularly requested to notify the Local Secretaries at the earliest moment possible.

The address of the Permanent Secretary will be Salem, Mass., until August 17th; after that time and until the meeting has adjourned, his address will be Windsor Hotel, Montreal, Canada.

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B. Physics—T. C. Mendenhall, of Columbus.

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G. Histology and Microscopy—A. H. Tuttle, of Columbus.

H. Anthropology—Daniel Wilson, of Toronto.

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- D. Mechanical Science—Chas. B. Dudley, of Altoona.
- E. Geology and Geography—C. E. Dutton, of Washington.
- F. Biology—Charles S. Minot, of Boston.
- G. Histology and Microscopy—Robert Brown, jr., of Cincinnati.
- H. Anthropology—Otis T. Mason, of Washington.
- I. Economic Science, and Statistics—F. B. Hough, of Lowville.

Treasurer—William S. Vaux, of Philadelphia.

The Annual Meeting of the Society for the Promotion of Agricultural Science will be held at the rooms of the Natural History Society, Montreal, on August 21st and 22nd. The American Forestry Congress will be held at the same time in Forestry Chambers, opposite St. Lawrence Hall.

OUR ANNUAL MEETING.

By the kind permission of the Hon. S. C. Wood, the Commissioner of Agriculture for the Province of Ontario, the Annual Meeting of the Entomological Society of the Province of Ontario will be held at Montreal during the first week of the meeting of the American Association for the Advancement of Science. The meeting will be held at the rooms of the Montreal Natural History Society, on Thursday afternoon, August 24, at 3 o'clock. It is expected that there will be a large attendance of those interested in Entomology.

A meeting of the Council of the Society will be held on Thursday morning at eleven o'clock, at the residence of the Vice-President of the Society, Mr. J. G. Bowles.

CORRESPONDENCE.

DROSOPHILA AMPELOPHILA.

DEAR SIR,—

In a letter recently received from Mr. S. W. Williston, of New Haven, Ct., he says, in relation to the above insect: "I would call your attention

to the 'two branched bristles' of the head. You will find that they are inserted in the third (last) joint of the antennæ, and correspond to the 'plumose arista' of the common house-fly, for example. They are found in all our species of *Drosophilidæ*."

G. J. BOWLES.

DROSOPHILA AMPELOPHILA, LOEW.

DEAR SIR,—

In the autumn of 1879 I bred and recognized numerous specimens of *Drosophila ampelophila*, Lw., at New Haven, from decaying pears, labelled specimens bearing date of Oct. 30. Since then I have observed them in August, September and October in the greatest abundance in Massachusetts and Connecticut. Perfectly sound fruit I have never known to be attacked by them, but the slightest indication of fermentation attracts them in great numbers, and about heaps of cider refuse I have seen them in clouds. Species of the family may be easily mistaken for one another, but by aid of Mr. Bowles' accurate figure of the wing, and by the presence in the male, on the tips of the anterior metatarsi above, of a minute but conspicuous black tubercle, the present Fermenting Fruit Fly may be with certainty distinguished. Loew apparently had some knowledge of its habits in giving it the name *ampelos*. As regards its distribution he says (Cent. II., 99): "*Drosophila ampelophila* in Europae regionibus meridianis frequentissima nec Europae mediae plane aliena etiam in meridianis Africae partibus habitat." The question is an interesting one: In which continent is it a native? The European *D. confusa*, as well as *cellaris* and *aceti*, appears to have very similar habits; doubtless other of our American species will be found to infest fruit.

S. W. WILLISTON.

New Haven, 28th July, 1882.

LARVÆ OF PAPILIO THOAS.

DEAR SIR,—

For several years past I have seen a few specimens of *Papilio thoas* in this locality, in the month of August, but in poor condition; this year they appeared as early as the middle of June. I have just found for the first time the larvæ in my garden feeding on *Dictamnus fraxinella*. There are two broods—one quite small, and the other three quarters grown.

G. H. VAN WAGENEN.

Rye, Westchester Co., N. Y., July 17th, 1882.

ON CAPIS, GROTE.

DEAR SIR,—

Mr. Grote's reply to my remarks on *Capis* contains a statement which requires correction. He says: "Every student ought to know that in the Deltoids the eyes are always naked, the tibiæ unarmed." The latter part of the sentence is correct, but as a very fair proportion of the *Deltoidæ* have lashed eyes—Mr. Grote, himself, having described three genera with that character—the remainder of it is rather new and surprising, and contains information which all students are excusable for not having previously known. Generic descriptions should always be complete. *Capis* is said to be like *Sisyrhypena*; that genus is described as *Crambiform*. Before it is possible to know what *Capis* is like, we must go through *Sisyrhypena*, hunt up what *Crambiform* is, and graft on that the difference between *Capis* and *Sisyrhypena*! I do not consider my "Remarks on *Capis*" answered by Mr. Grote's reply. I am obliged to Mr. Grote for his offers of assistance.

JOHN B. SMITH.

BOOK NOTICES.

The Hessian Fly—Its ravages, habits, enemies and means of preventing its increase, by A. S. Packard, jr., M. D.; being Bulletin No. 4 of the Department of the Interior, U. S. Entomological Commission, 8vo., pp. 43, illustrated by two plates containing many figures, one wood-cut and a map: being a synopsis of all that has been published in reference to this destructive insect, with such additional facts as the members of the Commission have been able to collect.

A Treatise on the Insects Injurious to Fruit and Fruit Trees in California. By Matthew Cooke, chief executive Horticultural officer; 8vo., pp. 72.

This useful pamphlet treats of the Codlin Moth, which has now taken up its permanent residence in California, making apple and pear growing in some sections very uncertain; the Pear Slug, the Red Spider, the Tent

Caterpillar, Currant Borèr, and several species of Scale Insects which attack the apple, pear, peach, plum, orange, etc., illustrated by a number of wood-cuts. It appears that our California friends are now seriously affected by insect pests, from most of which they had until of late been free. The fruit interests of this State are so highly important that very active measures are being taken to keep these insect pests within bounds, and an Act has been passed by the State compelling the general adoption of such remedial measures as shall from time to time be found of value. We shall watch with interest the effect of such legislation, and sincerely hope that it may result in a marked abatement of the evils complained of.

Revised Check List of North American Birds, with a Dictionary of the Etymology, Orthography and Orthoepy of the Scientific Names. By Dr. Elliot Coues ; 1ge. 8vo. Estes & Lauriat, Boston.

Such a book from such a pen cannot fail to come into the hands of a great many Ornithologists, and the circulation of so valuable a work will greatly tend to render this much neglected part of the science more widely studied and understood. The first part of the book is devoted to notes and general explanations on Etymology, Orthography and Orthoepy. The second part contains the Revised Check List proper, and on the latter part of each page the names divided into syllables and marked for pronunciation and accentuation, with copious notes on the derivation. In regard to the nomenclature, the author has in many instances in this work taken a stand opposed to that of some eminent Ornithologists of the present day, which is much to be regretted in view of the desirability of uniformity in this matter.

The printing is excellent and done on fine heavy paper, and the proofs have evidently been most carefully read, altogether forming a very attractive volume and a valuable addition to the Ornithologist's library.
—W. E. S.

ERRATA.—In our last issue, page 120, on 2nd, 11th and 12th lines, for "*Serion*" read *Sinon*.

The Canadian Entomologist.

VOL. XIV.

LONDON, ONT., AUGUST, 1882.

No. 8

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in the rooms of the Natural History Society, Montreal, on Thursday, August 24, 1882, at 3 o'clock, p. m.

The President, Mr. Wm. Saunders, of London, Ont., in the chair.

Present: H. F. Bassett, Waterbury, Conn.; Rev. C. J. S. Bethune, M. A., Port Hope; G. J. Bowles, Vice-President, Montreal; F. B. Caulfield, Montreal; Prof. J. H. Comstock, Cornell University, Ithaca, N. Y.; Prof. A. J. Cook, Agric. College, Lansing, Mich.; Wm. Couper, Montreal; T. Craig, Montreal; J. M. Denton, London; C. R. Dodge, Washington, D. C.; Prof. C. H. Fernald, State Coll., Orono, Maine; C. Fish, Brunswick, Maine; Jas. Fletcher, Ottawa; Rev. F. W. Fyles, Cowansville, P. Q.; Prof. H. A. Hagen, Mus. Comp. Zool., Cambridge, Mass.; W. H. Harrington, Ottawa; Prof. S. Henshaw, Boston, Mass.; Dr. P. R. Hoy, Racine, Wis.; J. G. Jack, Chateauguay Basin, P. Q.; Dr. H. S. Jewett, Dayton, Ohio; Prof. J. A. Lintner, State Entomologist, Albany, N. Y.; H. H. Lyman, Montreal; B. Pickman Mann, Assist. Entomologist Agricul. Dept., Washington, D. C.; Prof. C. V. Riley, Entomologist Ag. Dept., Washington, D. C.; Wm. Shaw, Montreal; E. D. Winble, Montreal; C. D. Zimmerman, Buffalo, N. Y.; E. Baynes Reed, Sec.-Treas., London, and others.

The minutes of the previous meeting were confirmed, the reading being dispensed with as they had been printed and sent to the members.

The President then addressed a few words of cordial welcome to the members present.

The report of the Council and the financial statement of the Sec.-Treas. for the past year were then read, and on motion, adopted.

The report of the Montreal Branch was submitted and read to the meeting.

The election of officers then took place, when the following gentlemen were duly elected:

President—Wm. Saunders, London.

Vice-President—G. J. Bowles, Montreal.

Secretary-Treasurer and Librarian—E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, Port Hope ; J. Fletcher, Ottawa ; Rev. F. W. Fyles, Cowansville ; W. Couper, Montreal ; J. M. Denton, London ; J. Alston Moffatt, Hamilton ; W. H. Harrington, Ottawa.

Editor of Canadian Entomologist—Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. B. Reed.

Auditors—H. B. Bock and C. Chapman, London.

The President then delivered his annual address, for which he was unanimously tendered a vote of thanks, accompanied with a request to publish it in the CANADIAN ENTOMOLOGIST.

ADDRESS OF THE PRESIDENT.

GENTLEMEN,—For the first time in the history of our Society, we meet within the limits of the Province of Quebec. Although belonging to Ontario, and sustained in our work mainly by the liberal aid granted us by the Government of Ontario, our sphere of usefulness extends throughout the length and breadth of this great Dominion, and also across the lines into the United States. We have long had an active branch of our Society in Montreal, comprising members who have materially aided in the advancement of Entomological science, and now at this particular juncture, when so large a body of distinguished scientists were to honor Montreal with their presence, and among them many noted Entomologists, no time, it was thought, could be more opportune than this in which to hold the annual meeting of our Society, and by the kind permission of the Hon. S. C. Wood, Commissioner of Agriculture for the Province of Ontario, we are privileged to meet here on this occasion.

During the past season that dreaded pest, the Hessian Fly, has prevailed to a considerable extent in Ontario. My attention was first called to it this season during the last week in July, when the grain was ripening. On visiting wheat fields in the vicinity of London, I found the insect very prevalent, and in some instances I believe the injury to the crop must have been fully twenty per cent. The affected stalks were lying on the ground, and the grain in the heads imperfectly developed ; on pulling these they would often break at the point where the insect had been at work, that is, about the base of the first or second joint. On examining the affected stalks, the insect was found to be in what is known as the

puparium or flax-seed state, from the resemblance which it bears in this condition to a grain of flax-seed. The attention of farmers was drawn to the depredations of the insect by a communication to the press, and information sought as to the extent of the evil. From letters received from various sections of the Province, it is evident that the insect prevails over an extended area, and that the sum total of the loss entailed on the agricultural community in Ontario from this cause would figure up to a large sum, probably hundreds of thousands of dollars. In 1876 and 1877 this insect appeared in considerable force and seriously injured the wheat crop in many parts of our Province, but since that time we have enjoyed comparative immunity from it until now.

The Hessian Fly belongs to the order of Diptera, or two-winged insects, and is about one tenth of an inch long, with dusky transparent wings fringed with fine hairs. There are two broods during the year. The flies which appear in the autumn deposit their eggs from one to twenty or more on a plant in the cavities between the ridges of the blades or between the stalk and sheathing base near the roots of the young fall wheat. These hatch in four or five days into tiny grubs, soft, smooth and shining, which work their way down the leaf to the base of the sheath, about the crown of the root. Here they fasten themselves head downwards to the tender stalk, live upon the sap and gradually become imbedded more or less in the substance of the stalk. When once located the larva moves no more, but growing rapidly, soon becomes plump, and when mature is about one sixth of an inch long, greenish, and semi-transparent; before long it changes to the flax-seed state, in which condition it remains throughout the winter. Early in spring the flies are produced, which deposit their eggs about the first or second joint of the stalk, where they pass through their several stages, assuming the flax-seed state a few weeks before the wheat ripens, from which the flies hatch in August and September.

The effect of the presence of this insect in the young fall wheat is to weaken the plants, which become unhealthy, turn yellow and sometimes die. Often there is a gall-like swelling or enlargement of the stalk near the base, in and about which the insects will be found. The unhealthy plants contrast strongly with the rich green of the vigorous uninjured grain. The late brood may be easily found by separating the leaf from the stalk of the young wheat in October or November; the early brood, as already stated, in the reclining stalks, which, when very numerous, makes the wheat appear as if "lodged" in patches.

Various measures have been recommended for the destruction of this insect. Some have advised the immediate threshing of the wheat and the burning of the straw, but since most of the insects are left in the stubble this would be labor lost. Tearing up the stubble with a cultivator immediately after harvest, and raking it into heaps and burning it, is another suggestion, but this involves much labor at a time when the farmer is extremely busy, and during the process many of the insects would necessarily be shaken out of the stalks and escape. Burning the stubble in the field where practicable is a much wiser course, but it must be borne in mind that this process involves the destruction of the friendly parasites which feed upon the enemy, as well as the enemy itself. In my address to you two years ago, I expressed the opinion that we were almost wholly indebted for such immunity as we enjoy from destructive insects to the insect parasites which destroy them; subsequent experience has confirmed this view, and any measure which involves the destruction of these useful friends should be adopted with caution. I am happy to state that from specimens reared within the past few days, I find that a large proportion of the Hessian Fly is being destroyed by parasites this season. Late sowing has been much recommended, and the results seem to prove that on the whole this is the most practicable remedy—to defer sowing until about the 20th of September, by which time most of the flies will have disappeared; late sowing, however, has the disadvantage that the plants not being so well established, are not as well fitted to withstand the severe weather of the winter. High culture is advantageous, as the luxuriant growth which the young wheat makes under such circumstances will enable it better to withstand the weakening effects of the grubs. Among the other measures recommended are pasturing the wheat fields with sheep, and the application of lime to the young wheat to kill the larvæ.

During the past few weeks I have examined the roots of a number of sickly-looking grape vines about London, Ontario, and have found the root-inhabiting form of the *Phylloxera vastatrix*, the dreaded scourge of the vine in Europe, in considerable numbers on the young rootlets, and have been able to clearly trace the diseased condition of those vines to that cause. I am convinced that this insect prevails to a greater extent than may at first be suspected throughout our Province, and that it is inflicting material injury, for besides having found it common about London, I have satisfactory evidence of its presence in the neighborhood of Grimsby, where many vines are reported as diseased, and have also

found it recently injuring the vines at Paris. There are no symptoms which indicate the first onset of this insect ; it is only after the Phylloxera has destroyed a large portion of the roots, that the vine assumes a sickly aspect, becoming stunted in its growth and yellow in the foliage. On examining the roots of a vine so affected, most of the small rootlets—through which the vine draws the chief part of its nourishment—are found dead and with many small knots and swellings on them. If a few freshly formed, living rootlets can be found, which may in such cases be looked for about the crown of the vine, these minute lice will usually be seen clustering upon them, often surrounded by groups of their eggs, and causing little swellings thereon ; but it frequently happens that when the vines have reached this depleted condition, no insects can be found ; they have entirely left them, and traversing the interlacing roots of other vines, found their way to richer pastures.

This insect occurs in two very different forms ; in one, known as the gall-inhabiting type, it is found upon the vine leaves, producing in June, July and August globular or cup-shaped galls of varying sizes, of a greenish red or yellowish color, with their outer surface uneven and somewhat woolly. The enlargement is on the under side of the leaf, and if one is cut into, it will be found to contain from one to four orange colored, wingless lice, and a large number of very minute, oval, pale yellow eggs, with some newly hatched lice. Soon the gall becomes too thickly populated, when the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves on the same leaf or on adjoining younger leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice mature and increase. These galls are quite common, especially on leaves of the Clinton and other thin-leaved varieties, also on the wild grape ; they sometimes occur in such abundance as to cause the leaves to turn brown and fall prematurely from the vine, and instances are recorded of defoliation from this cause. Late in the season, as the leaves become less succulent, the lice either perish or seek other quarters, and some of them find their way to the roots of the vines and establish themselves as already described, where, with their change of habit, there follows a slight difference in their appearance. During the winter they remain torpid, renewing their activity in spring. As the summer advances, a portion of the root lice acquire wings, when they issue from the ground, and rising in the air, they fly or are carried with the wind to neighboring vineyards, where they

deposit eggs on the under side of the leaves, among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. The complete life history of this insect, which is extremely interesting and curious, may be found in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by Prof. C. V. Riley.

The gall-inhabiting type of this insect may be subdued by picking off the infested leaves and destroying them, but the root-inhabiting type is a much more difficult form to deal with. Various applications to the soil have been recommended, such as bisulphide of carbon, and carbolic acid diluted with water and poured into holes made in the soil about the roots; soot, lime and ashes have also been suggested, strewed around the vines.

Several species of predaceous insects prey on this louse. The larva of a small fly, an undetermined species of *Diplosis*, deposits its eggs within the gall, in which the larval and pupal stages are also passed. The larva of this friendly species, although destitute of legs, is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. I have found no evidence of its attacking the parent lice, the newly born and tender progeny being more to its taste, and in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two are found in a single gall, but in no instance have I found living lice with the chrysalids, an evidence that its beneficial work is completed before this change takes place. An active mite, *Tyroglyphus phylloxera*, the larva of a Syrphus fly, *Pipiza radicans*, also the larva of a small dull-colored Lady-bird, a species of *Scymnus*, all aid in keeping in subjection the root-inhabiting form.

Most of our American vines are much more vigorous than the European sorts, and hence are likely to endure the inroads of this insect much better. As the insect is native to our country, our vines must have always been subject more or less to its attacks, and hence probably have developed a hardier constitution, with greater capacity for endurance or resistance. Last year I observed on some Concord vines evidences of unhealthiness, which I now believe arose from the presence of *Phylloxera*; this season most of them seem to have recovered their natural vigor. This inspires the hope that our vines may be able to endure the presence of this pest without very serious injury or loss.

During the month of July I received from Prof. J. A. Lintner, State

Entomologist of New York, specimens of parasitized eggs of the Gooseberry Sawfly, *Nematus ventricosus*, which he kindly sent me for the purpose of enabling me to introduce the parasite into Canada. This parasite is a very minute four-winged fly, probably *Trichogamma pretiosa*, with very delicate fringed wings. Some of these I placed while still unhatched near to eggs of the Sawfly recently laid on currant leaves. It is sincerely hoped that the effort for their introduction into Ontario will be successful, as they seem to do their work very thoroughly, every egg in the examples sent me being parasitized. The presence of the parasite may be detected by the discoloration of the egg, which becomes brown.

Recently I have received from a correspondent in Oakville, Mr. M. Felan, some examples of the destructive work of *Systema frontalis* on grape vine leaves. This beetle, although very generally distributed, has not, as far as I know, ever been recorded before as destructive or noxious. In this instance it seems to be quite local in its abundance, as my correspondent informs me that they are not found on his neighbor's vines, although very abundant and destructive on his own, eating the green tissues of the leaf on the upper side and causing it to wither.

Examples of what appears to be a new disease on the pea have lately been brought to my notice from several localities, under the impression that it was caused by an insect. The disease manifests itself in a series of white fleshy swellings at short intervals along the fibrous roots, varying in size from one-sixteenth of an inch to one-eighth of an inch or more in diameter, irregular in form, and of a solid fleshy structure. Microscopical examination has convinced me that it is a fungus growth in the production of which insects play no part. It appears to have the effect of stunting the growth of the plants and lessening the crop.

The short fruit crop this year, after the abundant promise of the spring, has been by many attributed to the work of insects, but this I am satisfied is an error, for while in many instances a small amount of injury has been done by insects, the main causes of the failure must be looked for elsewhere. Insects are important agents in the fertilization of fruit blossoms, and at the time of the abundant blossoming of the past season wet weather prevailed with an unusually low temperature, which prevented the insects then on the wing from visiting the flowers; the low prevailing temperature may have also interfered with the proper maturing of the fertilizing agent, while the frequent rains washed away from the opening

flowers much of the pollen as formed. To these causes combined may probably be attributed the lack of fertilization of the blossoms. Following this unfavorable weather, and doubtless induced and fostered by it, a species of minute fungus attacked the leaves, extending over a large portion of their surface, and often down the leaf-stalk to their base, causing a dark brown discoloration. This same fungus attacked the young fruit also, deforming a considerable proportion of the few specimens which were to be found, and these attacks resulted in a withering and curling of the leaves; the young fruit became stunted and deformed, and in many instances much of the foliage dropped to the ground. The effect of this injury, even at this advanced period in the season, is still to be seen in the sparseness of the foliage on many of the trees, in the discoloration of the leaves and the stunted growth of the branches.

It is difficult to anticipate with any certainty the effect of this disease on the fruit crop of next year, but since as a rule any interruption to the healthy growth of a tree leads to the more abundant production of fruit buds, it is probable that with a favorable season, we may have a very abundant yield in 1883.

California has for some years past been shipping fruits from her abundant surplus to all parts of the continent, and her favored climate furnished conditions under which pears, apples, plums and grapes prospered to an extent unknown elsewhere, and for many years almost free from the insect pests which in other fruit-growing regions levy so heavy a tax on the growers. But this exemption could not be expected to be permanent. The Codlin Moth made its appearance there in 1874, and ever since then has been increasing to an alarming extent, the climate favoring its propagation with a rapidity unknown in less favored districts, so that there are three, and in some instances four broods in a season. They attack the pears and quinces, as well as the apples, and destroy and disfigure a large quantity of fruit. California fruit growers are also suffering from the Phylloxera, Pear-tree Slug, Red Spider, Tussock Moth Caterpillar, the Currant Borer, a native Tent Caterpillar, *Cistiocampa constricta*, and a number of species of bark lice or scale insects, which attack apple, pear, peach, plum, orange, lemon, fig and olive trees, being found alike on the bark, foliage and fruit, and which multiply with amazing rapidity. Recognizing the vast importance of the fruit crop to the State, the most stringent measures are being enacted for the purpose of subduing these pests. An

Act was passed by the State Legislature in March, 1881, in the interests of horticulture and viticulture, providing for the appointment of a State Board of Commissioners, one from each of the large fruit-growing districts, with almost unlimited powers to restrain, seize, or prohibit the importation of anything and everything likely to aid in distributing these insect pests—any suspected vines, vine cuttings, trees, empty fruit boxes or other material likely to spread insects or contagion, and any willful violation of the quarantine regulations of this Board is considered a misdemeanor and punishable with a fine of from \$25 to \$100. These Commissioners are also charged with the duty of preparing rules to be observed by fruit growers for the extermination of insects, and suitable powers are given them to enforce the carrying out of these rules. In reference to the Codlin Moth, every apple grower is compelled to scrape the rough bark off his apple trees every spring, to collect and burn the scrapings, and apply, after scraping, an alkaline wash—the constituent parts of which are specified—to the tree. All boxes in which apples, pears or quinces have been stored or shipped are required to be dipped in boiling water containing a pound of commercial potash to each 25 gallons, for at least two minutes. These measures look to the destruction of the pupa. But, further, bands of cloth or paper of a specified width must be fastened around each apple, pear and quince tree, before the fifteenth day of May in each year, and examined every seventh day afterwards throughout the season, and all larvæ or pupæ destroyed. Precautionary and remedial measures are being enforced in reference to many other destructive insects, and any laxity or omission on the part of fruit growers in carrying out the instructions of the Commissioners is punishable by fine. The chief officer of the Commission is required to visit, examine and report upon the fruit growing interests in the various sections of the State, appoint resident inspectors for each county to enforce the regulations adopted by the Commission, and to experiment on the best methods of subduing insects and diseases destructive to fruits, and disseminate the information so obtained. For the carrying out of these objects an appropriation is made by the State of ten thousand dollars a year.

Those interested in Economic Entomology will, I am sure, watch with much interest the effect of such vigorous legislation, and if measures of this character can be successfully enforced there, why not elsewhere? There seems to be a necessity for the general adoption of some stringent measures which would prevent the careless and lazy from making their

grounds the breeding places of noxious insects which prey upon and destroy the crops of their more thrifty neighbors.

I have the honor to be,

Yours very sincerely,

WM. SAUNDERS.

There being no further business, the meeting of the Entomological Society of Ontario was then adjourned.

The meeting then resolved itself into an informal gathering of the Entomological members of the American Association for the Advancement of Science, then in session in the city of Montreal.

On motion, Mr. W. Saunders and Mr. E. B. Reed were requested to act as Chairman and Secretary respectively of the meeting.

Some discussion took place respecting the Entomological Club of the A. A. A. S., when it was moved by Dr. Hagen and seconded and duly carried :

Resolved,—That Prof. J. A. Lintner be requested to take the necessary steps to call further meetings of the Entomologists present at this session of the Association, at such times and places as might be determined on, and also to provide for similar meetings for Entomological discussions at the future annual gatherings of the Association.

PEA FUNGUS.

Mr. Geo. McCloskie, of Princeton, N. J., asked for some information about a peculiar fungus-like growth on pea roots, referred to in Mr. Saunders' address. The Chairman gave it as his opinion that it was a fungus.

Samples were shown exhibiting the pea as affected by this disease.

COTTON WORMS.

Mr. Jas. Fletcher asked if there was any further information respecting the habits of the Cotton Worm Moth, *Aletia argillacea*, he believing that from its frequent occurrence in Ontario in such a perfect condition, it must breed in Canada ; he was aware that the larva had never been found here and that Prof. Riley had in his able paper on this moth, expressed his conviction that the moth did not breed in Canada.

Prof. Riley stated that so far as he knew from repeated observations and experiments, the cotton plant, *Gossypium*, was the only food plant of this insect ; he thought that the peculiar formation of close-fitting scales

of the wings would account for the apparently fresh condition of the moths found in Ontario, and he believed that the insect possessed ample powers to fly such a distance as that from the Southern States to Canada. There might be a probability that the insect bred in the Northern States, but he was still of the opinion that the moth was a purely Southern species.

Dr. Hoy stated that he had found in Wisconsin a specimen of the moth at the end of August, with the fore and hind wing on one side of the body in a deformed and crippled state, evidently showing that it must have very recently emerged from the chrysalis. He also stated that a female moth had been captured near his residence about the middle of June. He thought the insect must breed in the North sometimes.

Prof. Comstock confirmed Dr. Hoy's statement as to the finding of the crippled moth, but thought, however, that the moth generally bred in the South.

Prof. Fernald said he had seen fresh specimens taken in Sept., in Maine.

The Chairman said that occasionally fresh moths and butterflies might be captured in entirely new localities, but that generally some probable reason could be given for their appearance; as, for instance, he remembered that many years ago two fresh specimens of *Argynnis columbia* had been found at St. Catharines, Ont., a place where they had never before or since been observed, but that they had probably found their way there among the large number of fruit and other trees imported from the States; still, however, no such probable reason had been suggested for the appearance of the Cotton Worm Moth in Ontario, in such frequent numbers and at so many different localities. The matter was one of great interest.

Mr. Fletcher said he hoped the members would continue their observations of this insect, the larva of which, if found in Canada, would probably feed on some *Malvaceous* plant.

(To be Continued.)

RE-PUBLICATION OF VOLUMES I. AND II.—In consequence of the demand from various European scientific societies and others for complete sets of the CANADIAN ENTOMOLOGIST, the Editing Committee have found it necessary to reprint the first and second volumes, which had been long out of print. The Society can now supply at the usual price copies of all the volumes, on application to the Sec.-Treas., Mr. E. Baynes Reed, London, Ont.

DESCRIPTION OF A NEW SPECIES OF COPÆODES.

BY W. H. EDWARDS, COALBURGH, W. VA.

COPÆODES WRIGHTII.

Male.—Expands .9 inch.

Upper side yellow-ochre color; costal margin of primaries black on the edge, and hind margins of both wings edged black, scarcely more than a line; costal margin of secondaries broadly bordered black; the ends of the nervules on primaries edged black for a little distance; on the disk a black sexual narrow bar, broken into three parts, and crossing obliquely the lower median and submedian interspaces; fringes pale black shading into whitish.

Under side pale yellow-ochre of one shade; a little dusky near base of primaries, otherwise immaculate.

Female.—Expands 1.2 inch.

Color of male, the nervules not edged black; immaculate.

Under side as in the male.

From 4 ♂, 2 ♀, part of 18 examples taken in the Mohave Desert, So. California, July, 1882, by Mr. W. G. Wright.

Mr. Wright says: "I have made a four days' trip to reach the Mohave Desert. We went over a pass 6,000 feet high, in the higher portions of which I saw a few *Chionobas*? but took only three, as they were very skillful in getting into the thorn bushes. Next on the high dry plain, I took a ♀ *Anthocharis*, perhaps *Lanceolata*. Then it was perfectly dry and barren for 20 miles to Mohave River. About 60 rods from the river came a change in the vegetation, the whole ground being covered with a salt weed somewhat resembling eastern "hog weed," but more branched, and upon the flowers of that I saw these bright little yellow *Copæodes*. I instantly jumped out and told my companion to go on to the river, and then and there I collected 18 of them. More could have been got, but they were rather lively, and I thought I had enough, especially as I saw other things, one of which was a black species (*Amblyscirtes Libya*). Here also I took a few *Pamphila Sabuleti* and *P. Campestris*. In the desert I saw an orange butterfly" (probably *Terias*), "but could not take it. The flight of this was exceedingly rapid and erratic, and over bushes which rendered pursuit difficult or impossible. These orange

butterflies were always several miles from water. When I went out I thought I should find a good many insects at the watering places, water being so scarce there, but on the contrary, I found few or none there. The springs or wells are 15 to 25 miles apart, and the intervening desert is absolutely dry and parched, yet in good part is covered with bushes of several kinds, cactus, etc., and also sometimes with a monstrous tree, the "Joshua," *Yucca brevifolia*, which looks as if it belonged to another world. No gnats, no mosquitoes, but few birds, no squirrels, very few snakes and those all rattlers, but plenty of sand and so hot! The sun beats down with vertical rays and the air is like that from a furnace. I saw no other butterfly at the river than I have mentioned, except one Danaids, small, pale-colored, and it seemed to me differently marked from any I have seen at San Bernardino."

NOTES ON THE LARVA OF BUCCULATRIX AMBROSIÆFOLIELLA.

BY V. T. CHAMBERS, COVINGTON, KY.

This species was described by me in the Cincinnati Quarterly Journal of Science, v. 2, p. 119, and it was said to feed upon the leaves of *Ambrosia trifida*, in the larval stage. Afterwards, in a note in the American Entomologist, I suggested that as it had only been bred from a collection of leaves of that plant, and had not actually been seen feeding, and as some species of *Bucculatrix* sometimes crawl away from their food plants to pupate, it was possible that it might turn out that this larva did not feed upon Ambrosia. This summer, however, I have been fortunate enough to find the larva mining the leaves of *A. trifida*, and also of several varieties of *Helianthus*; indeed it is much more numerous on *Helianthus* than on *Ambrosia*. *Lithocolletis ambrosiæella* and *L. helianthivorella* feeding on the same plants, many would consider only varieties of one species; as also many would consider *Tischeria ambrosiæella* and *T. heliopsisella*, which feed on the same plants, and on *Heliopsis*, varieties of one species. It is a little singular that so many of these minute leaf-mining species should feed on so many varieties and species of *Helianthus* and *Heliopsis*, and all on the single species of *Ambrosia*, and on no other

species of that genus, except that *Tischeria ambrosiæfoliella* feeds also on *Ambrosia artemisifolia*. *Butalis matutella* feeds on *A. trifida* and on Asters; but not, so far as is known, on any other species of *Ambrosia*, nor on *Helianthus* or *Heliopsis*. *A. trifida* seems to be a point from which they radiate, so to speak, to other *Compositæ*.

In the published description of *Bucculatrix ambrosiæfoliella* I find that I have omitted to mention the minute tuft of brown scales on the dorsal margin of the fore wings, and that in the sentence which reads, "the scales between the black internal edging of the arc, and the costal margin, are ochreous," the word "dorsal" should be substituted for "costal."

The larvæ of several species of *Bucculatrix* are known in Europe; but in this country, until now, Dr. Clemens' "mere mention" of the larva of *B. pomifoliella* Clem., is all that has been published. Briefly the larval habits of the genus may be thus summarized: The larva while very young mines in leaves, and leaving the mine, it feeds externally, moulting once in a little cocoonet, and again in a singular ribbed cocoon, where it passes the pupa stage. Dr. Clemens says truly that the larva of *B. pomifoliella* feeds on apple leaves, and pupates "in an elongate, dirty white, ribbed cocoon," but this, with a brief description of the larva in one of its stages, is about all of the information that he gives us about it. *B. pomifoliella* is not uncommon in this region (Kentucky), but I have never met with the larva, and until I met with the larva of *B. ambrosiæfoliella*, larvæ of this genus have been unknown to me.

I have elsewhere suggested that, owing to certain structural resemblances of the pupæ of *Bucculatrix* and *Lithocolletis*, it would be found, when the larva of *Bucculatrix* was dissected, that it belonged to the same larval group with *Lithocolletis*, *Gracillaria*, etc. In this group of larvæ the mouth parts are in the first stages very imperfect, the maxillæ, and both maxillary and labial palpi, are either entirely wanting or very rudimentary, and the other mouth organs are of very different form and structure from that of ordinary caterpillars. At some subsequent moult (first, third or fifth, as the case may be—varying in different genera and species of the group) this "ordinary" form is assumed, and I have therefore usually mentioned the imperfect form as the "first" form, and the other as the "second" or "ordinary" form. My suggestion as to *Bucculatrix* was that, where the mouth parts of the larva in its first stage were examined, it would be found to have mouth parts of the "first" form, because in its pupa state certain structures of the head and 2nd segment

are similar to structures possessed by *Lithocolletis*, *Gracilaria*, and other genera, the larva of which in their early stages have mouth parts of the "first" form. A peculiarity of this "first" form is that, owing to the structure of the mouth parts, the larva possessing them can not feed down into the parenchyma like a larva having trophi of the "ordinary" form, but can only eat in the plane in which the larva lies, consuming a few of the cells of the parenchyma lying next to the cuticle, and leaving all beneath it uneaten; while a larva with the "ordinary" form eats out the whole parenchyma, or at least eats down into it. A glance at the mine of *B. ambrosiaefoliella* was therefore sufficient to show me that my suggestion as to the group to which *Bucculatrix* belongs was unfounded; the entire parenchyma was eaten out, and therefore the trophi were of the "second" form, and different from those of *Lithocolletis*, etc. On closer inspection, however, the earliest part of the mine did not appear to have all of the parenchyma eaten out. Still it did not have the appearance of a mine of a larva having the "first" form of trophi; the eaten portion did not all lie close to the cuticle, but the parenchyma was irregularly eaten into—sometimes eaten almost through—in a way that could not be done by a larva with the "first" form of trophi, but which might have been done by a very young and small larva with trophi of the "second" form, and dissection showed that this was the truth of the matter. The larva never has trophi of the "first" form in any stage.

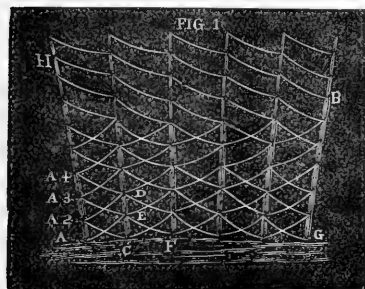
But among larvæ having trophi of the "second" form, there are sub-groups, each of which presents important differences from the others in the structure of the different organs. Thus, so far as I have examined, all the larvæ of *Rhopalocera* have trophi differing in some respects from those of *Heterocera*, except that the larva of the Tineid, *Plutella cruciferarum*, has larval trophi resembling those of the Skippers. The Attacidæ again form a sub-group. All of the other *Heterocera* again, except some of the Tineids to be presently mentioned, form another sub-group. These "other Tineids" comprise *Cemiostoma*, which stands alone; *Tischeria*, which also stands alone in some respects, whilst in others it resembles *Bedellia*, *Antispila*, *Aspidisca* and some others which are more or less similar to them, though differing from them in some respects, and among these is *Nepticula*. All of these I class in a single sub-group of larvæ. The larval trophi of *Bucculatrix* more nearly resemble those of *Nepticula* than any of the others. Mr. Stainton (not mentioning the larval trophi) has already written of *Bucculatrix*: "This genus offers several points of

resemblance with the next family" (*Nepticulidæ*), "but the larvæ have six well-developed true legs."—Ins. Brit., v. 3, p. 290. The six legs seem to have been Mr. Stainton's chief, if not only reason, for excluding *Bucculatrix* from *Nepticulidæ*, in which the six true legs "are wanting, and they are replaced by membranous processes or prolegs, yet neither on these segments nor on the remaining segments, each of which is furnished with a pair of prolegs (making eighteen in all), have the prolegs the usual coronet of little hooks" (Ibid, p. 296). Dr. Clemens says of *B. pomifoliella* that the legs are "very small," and though this can not be said of *B. ambrosiæfoliella*, yet its anal prolegs are destitute of the coronet of little hooks, having only a single little spine; while the abdominal prolegs have each only these little claws, rather than the usual tubercles; so that I do not hesitate to place *Bucculatrix* in the same larval group with *Nepticula*. The thoracic feet have each a single claw which is set around with numerous, rather stiff, bristles, and, as hereafter shown, are used to guide the thread in spinning the cocoon. Each segment of the body is clothed with numerous hairs, especially the pro-thoracic segment, where the hairs are stiff and project forward over the head; this segment in the adult larva has twelve microscopic red-brown spots, ten of which are on the back—four of them in the angles of a square, three others obliquely on each side of the square, and one other, larger but more indistinct, on each side; these spots I think are hypodermal.

The egg, a minute colorless globule, is deposited on the upper surface of the leaf, and the larva, leaving it, makes at first a short, tortuous, linear mine, which ends in a small blotch with the frass in compact lines. The first stage lasts probably between three and four days (the youngest larva I have seen was a little more than one-fortieth of an inch long). The larva at this stage is sordid white. Having ceased to feed, it doubles itself in what Mr. Stainton calls horse-shoe shape, the ventral surface of the anterior half being applied to that of the posterior half of the body, and thus it undergoes its first moult in the mine. The larva, when it has cast its old skin, is no longer sordid white, but is striped longitudinally; there is a dorsal green stripe, margined on each side by a white line, beneath which is another green stripe on each side, containing on each segment two white spots placed obliquely, the lower spot being the largest, and the under surface is pale greenish; the larva frequently has a faint pink tinge, and the longitudinal stripes, which are very faint at first, become darker with age. It remains in the mine and feeds for about one day

after its first moult ; then leaves it, and feeds externally for about two days, usually on the under side of the leaf, but occasionally also on the upper side. There it spins beside a rib a thin sheet of white silk, beneath which it spins a cocoonet, in which it again assumes the horse-shoe shape, and passes in about a day to second moult. Emerging from its cocoonet, it continues to feed externally for three days, when either on the plant or near to it, it spins its ribbed cocoon, in which it passes the pupa state. I have not observed accurately the length of this stage ; in August it is about a week. The mature larva is about three lines long.

I have frequently been puzzled to understand how the larva could spin this singular cocoon, but I have now fortunately been enabled to watch it at work under the microscope. The cocoon shows six longitudinal ribs or ridges, with depressions like valleys between them. Each rib consists of four threads, and is four times as thick as the depressions ; the threads of the ribs are longitudinal and rigid, those of the valleys run obliquely transverse, and each is permitted to droop or sag down, and they are spun



first from right to left, then from left to right, crossing each other at a somewhat acute angle, the one set being kept always about four threads in advance of the other, the finished portion of the cocoon showing the two threads crossing each other, while the unfinished shows only two threads without any thread crossing them, as shown in fig. 1 at *a* finished, at *b* unfinished, portion of the cocoon.

But properly speaking, this is no part of the cocoon, but only a reticulated frame or net-work, within and attached to which the true cocoon is spun. The whole net-work is a continuous thread, with no break ; each transverse thread continues entirely across the cocoon, but the ribs are not continuous threads the length of the cocoon ; each rib is made by a multitudinous succession of movements forward and back again, each movement only the length of the space between two transverse threads. Whenever in the transverse movement of the head, the apex of the spinneret touches a rib, it is moved forward and back again. Thus, the larva (having laid the floor or foundation of its reticulated frame-work by spinning its web somewhat densely over the portion of the leaf that is to

be covered by it, and for some little distance around it) reaches at length, we will say, the point *a*, fig. 1, when it is ready to begin the reticulated work. Working backwards, the head is now drawn back and a little out to *a* 3; the claw of the fore foot is here applied to the thread (which has no elasticity, or very little, and which hardens the instant it is fairly out of the spinneret); the head is drawn back along the line towards *a*, as far as *a* 2, where it leaves the hardened thread, using the claw again, and passes obliquely down and forwards again to the foot of the second rib at *c*, where it is attached to the floor, and the thread again bent on the claw, is retracted a little upwards nearly parallel to the line *a* and *a* 3, to the point *d* in the figure, when, again bent on the claw, it is carried forward (adjoining the newly spun thread) to the point *e*, where it leaves the thread (just as it did at *a* 2), and passes obliquely forwards again to the foot of the third rib at *f*, and this is repeated until the spinneret arrives at the point *g* at the base of the other side of the cocoon. It is then carried along the floor of the cocoon back to the point *a* 2, then it is again retracted to the point *a* 4, where it is bent on the claw and advanced again to *a* 3. In retracting the head from *a* to *a* 3, a single thread is left; returning it to *a* 2 adds another thread along that part; from *a* 2 to *c* there is only a single thread; retracting it to *d* leaves a single thread of course, while advancing it to *e* leaves another that far, and the thread leaves the rib, being carried to *f*, as above stated. Thus the base or beginning of each rib (at *a* and *c*, etc.) would consist only of a single thread, but while the spinneret is there it is passed several times up and down that part, and the thread is thus strengthened, and sometimes while at work on the reticulated net, the larva, on reaching the floor, would pass its spinneret over it in various directions, advancing under it up to its very beginning, thickening the floor, and fastening the attachments of the ribs to it, and sometimes retiring and entirely leaving the net-work so far that I thought it had left it finally; but it always returned, and continued its work on the reticulated frame which, as before stated, forms at first only the outer covering of the true cocoon. Hitherto the larva has been building in front of, around and over its head, gradually retiring as the work advanced towards it; therefore to make a line in one of the ribs it would retract its head, while to double the line it would advance its head or spinneret. Each of the obliquely transverse lines was permitted to sag down between the ribs and was long enough to do so by its own weight. To make each line in a rib the head was retracted the distance between three transverse lines, and

then, bending the thread, it was advanced over the space between two of these (that is, about one-hundredth of an inch) to the point where it leaves one rib to proceed to the next one.

But thus far we have each rib composed of only two threads and the transverse lines running in only one direction. How is it as to the other set of obliquely transverse lines which cross the first set? and how are the two additional threads added to each rib? All of this is done precisely as the first set was made. Returning from the side *g b* of the frame, the work is only a repetition in the opposite direction of the work first done as above related. Having finished about three-fourths of the frame, retreating from it and working towards itself, as above stated, the larva now passes up into it, adding to the floor and the foundations as it goes, till having reached the upper end, it doubles upon itself, and reverses its position, protruding about one-fourth of its body through the open end of the frame, which it now begins anew from the other end and repeats here the work already done, until the two portions almost touch. Then it ceases to follow the regular pattern of the reticulation, and by a series of longitudinal threads passed rapidly to and fro, connects the two pieces of the frame much as a tailor darns a rent in a garment, and this darn may be detected even in an old cocoon. The larva is now completely enclosed in the frame work, and immediately begins to spin its cocoon proper within it. This occupies only the central position, not extending into either end of the frame. It works very rapidly, and in three hours from the time that it begins to spin is entirely concealed from sight.

It is very interesting to watch the little architect at work upon its reticulated frame. It evidently understands its trade, whether we call it a house-builder or weaver. It knows exactly what it has to do, and how to do it, and "goes straight along" with its work with an air of as much conscious intelligence and understanding as any other builder of homes either with or without hands. It is difficult to watch its operations without feeling that here is a conscious intelligence at work. All other known species of the genus, save one, make these ribbed cocoons, and to do so they must work much as this one does. How the instinct to make a cocoon, and especially one like this, ever originated—what advantage in "the struggle for existence" the reticulated pattern possesses over a common one in which the threads are carried hither and thither apparently without order or plan—and why this instinct should be lacking in a single species, are questions as unanswerable as why some spiders are

geometricians. I will only add that if the larva ceased to spin when the reticulated frame work is finished, the cocoon would belong to the same class with those of *Plutella cruciferarum* and a few others which pupate simply in an open network.

Fig. 1 is very imperfect. It should represent the transverse lines not only as oblique, but as sagging down more than they do, and should show more clearly that each, on reaching a rib, passes along it, over the space between these lines, and is bent back over the space between two. It is proper, perhaps, to state that the threads harden so quickly, or lose their viscosity so quickly, that two threads in contact seldom adhere except immediately at the point of the spinneret.

I will add that so far as I have examined bred specimens of the imago, those from *Ambrosia* have the markings more sharply defined and the brown scales darker than those from *Helianthus*.

GONILOBA (*Eudamus*) TITYRUS, Fab.—I have within the last few days of the end of August made a capture of numerous specimens of the larvæ of two skippers—hitherto, it has been considered, rather rare in this locality, only an occasional specimen of either larva or butterfly being seen.

On a few locust trees and young second-growth of *Robinia pseudacacia*, adjoining my office, I took in about an hour some eighty specimens, and I am satisfied a very little exertion would have procured another hundred; on a subsequent search I also found them in another locality some distance off. The larvæ were nearly all three parts grown, and some just beginning to enter the pupal stage; in only one or two instances did I discover very young specimens. It is worthy of note that I only saw three specimens of the butterfly this summer, so that it could not have been very common. Dr. Harris says "that the viscid locust tree is sometimes almost completely stripped of its leaves by these insects, or presents only here and there the brown and withered remains of foliage which has served as a temporary shelter to the caterpillars." I could not see, however, that the larvæ had done any appreciable harm to the trees on which I found them, although their numbers would have led me to look for very material injury. I would state also that in some seven or eight instances in examining the empty leafy cases formed by the larvæ, I found single specimens of *Clytus pictus*, who seemed to enjoy the cool retreat thus provided for them from the heat of the sun.

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IS PAEDISCA SCUDDERIANA A GALL-MAKER?

BY D. S. KELLICOTT, BUFFALO, N. Y.

A gall from a Golden-rod, out of which a moth of this species has escaped, is figured in Second Report Insects of Missouri, page 134. In the accompanying description the author says: "There are some doubts in my mind as to whether it is a real gall-maker, or an inquiline, or an intruder on my true Solidago gall-maker (*Gelechia gallsolidaginis*). "My reasons for thinking this insect an intruder are, first, because if it were a true gall-maker, we should naturally expect to find its gall more common; second, because on several occasions I have found within the *Gelechia* galls a pale worm very different from the true gray gall-making larva." In the CAN. ENT., x., 202, I asserted, perhaps too abruptly, that this moth is not an intruder, but the cause of the gall in which it resides during the larval and pupal states. In the paper cited I gave my reasons for this conclusion, reasons which I considered sufficient, namely: that it was very abundant about Buffalo, that I had followed the larvæ in the galls from soon after hatching and soon after they had pierced the stem until final transformation, and that their gall habits were somewhat characteristic. In Bulletin No. 6 of the United States Entomological Commission, page 57, referring to this species (under the name *Euryptychia saligneana* Clem.), Mr. Riley says: "From comparison of female specimens I am led to believe that this is the same species that is commonly known in Europe as *Spilonota roborana* Schiff. . . . The insect in Europe is known to feed on the leaf-buds of the rose. I have abundant proof that in this country it is not a gall-maker, but as was inferred in the Report, an inquiline. I have found its larva feeding upon the flowers as well as amid the terminal leaves of the Golden-rod, and I have also found it in other galls." The above statements have led me to again examine the matter, and inasmuch as I cannot find evidence in support of the writer's views, but rather to confirm my own, I desire to record my observations.

This year I noted that the *Gelechia* galls were of full size before *P. Scudderiana* escaped from the pupa, and *G. gallsolidaginis* escaped from

its gall before those of the other were completely formed. These were observed as slight swellings or rings about the middle of July, and to grow quite slowly, attaining full size by the beginning of September; besides, the *Paedisca* galls, as a rule, are in entirely different situations, as pointed out in the previous paper referred to. The *Gelechia* galls are ordinarily on the stem below the branches, and usually only one occurs on the same plant; the other forms them higher among the branches, or, as often happens, on the branches themselves. As many as eleven galls have been counted on one plant. Likewise the differences of form, structure, position and date of appearance between this gall and that of *Trypeta solidaginis*, render it quite improbable that the one has any relation to the other. There is no other known gall that could be suspected.

I have again this summer observed larvæ of this species of all sizes in galls of corresponding sizes, from mere protuberances on the tender stems up to the well formed characteristic galls. This, it seems to me, is direct evidence of its gall-making habits.

The following experiments have a tendency to confirm such belief. Some Golden-rods, late in June, were planted in a bottomless pail sunk in the earth of my garden and closely covered by a net of tarlatan; some days later several old galls containing living pupæ were placed under the net. Early in July moths were observed within. August 8th the net was removed and several small yet unmistakable *Paedisca* galls were found on the Golden-rods. September 11th, the same are nearly of the usual size at maturity; no larvæ have appeared among the leaves at any date since the cover was removed. August 10th, I removed about a dozen of different sizes from their galls to the leaves and flowers of the above mentioned isolated plants; in a day or two all had disappeared except one which was boring into the stem at the axil of a branch, and at the end of a week it had caused a slight gall-like enlargement of the same. At another time a number of larvæ of different sizes were taken from their galls and placed on leaves and flowers of their food-plant in a feeding box; they refused to feed, and after days of ceaseless effort to escape died of starvation. Perhaps this result should have been expected, rather than submission to so material a change of food and residence.

After diligent search I have not found what I take for this larva feeding on the leaves or flowers, and in but one instance have I found it in any but its own gall, then in what was apparently an abandoned one of

the *Gelechia*, in which, as it seems to me, it had taken refuge after an accident to its own home.

I do not deny, however, that it may feed elsewhere upon leaves and flowers of the Golden-rod, or that it may occupy other galls; but I feel sure that, at least in this vicinity, it habitually makes the abundant gall in which it resides.

DESCRIPTION OF THE PREPARATORY STAGES OF NEONYMPHA AREOLATUS, SMITH-ABBOT.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Nearly globular; the surface smooth under a low power, but under a high one, thickly covered with shallow depressions, which are irregular in size and also in form, being pentagonal, rounded or oval; color pale green. Duration of this stage about 6 days.

YOUNG LARVA.—Length .12 inch; cylindrical, nearly even, tapering a little posteriorly, the last segment bluntly forked; color delicate green; over the surface many white hairs, and among these are black clubbed hairs disposed in longitudinal rows, four on the dorsum of each segment, two in front, two in rear; feet and legs green; head large, about twice as broad as any body segment, sub-globose, a little depressed at top; on each vertex a short semi-ovoid appendage, at the top giving out two divergent black hairs; just below vertex, on the front, is a similar smaller appendage with single hair, and on the side half way down is a second; color black. Towards the end of this stage the color of body changes to decided green, and several longitudinal stripes appear; on either side of a dark green medio-dorsal stripe is a whitish one, a similar one on middle of side and another along base. Duration of this stage about 8 days, but depending on the weather.

After 1st moult—Length .22 inch; slender, the dorsum slightly arched and sloping posteriorly; the tails longer, tapering; color of body green, the tails faintly red; surface quite thickly covered with fine yellowish tubercular points, partly arranged in longitudinal rows, ten in all, on either side one next the medio-dorsal green stripe, one sub-dorsal, two on mid-side and one along base; under side, feet and legs green; head ovoidal, truncated, depressed at top; on each vertex a low conical process; surface rough with sharp tubercles, of varying size, each with very short bristle;

color of back of head and of the triangle over mandibles deep green, the rest of the front and the processes on vertices red-brown, with two green patches on front, one on either side the suture; ocelli emerald-green. But some larvæ have the head wholly green, the vertex process reddish; one had a brown band across the forehead, the rest green; one had the front face except the triangle brown, the cheeks green. To next moult about 9 days.

After 2nd moult.—Length .3 inch; shape as before; color yellow-green; stripes as before; head as at second stage, sometimes wholly green, sometimes partly brown; one example had the left cheek brown, the other green. To next moult about 7 days.

After 3rd moult.—Length .7 inch; very slender, yellow-green. In all examples bred by myself this was the closing larval stage.

MATURE LARVA.—Length 1.1 to 1.3 inch; slender, thickest in middle segments, the dorsum well arched, and the slope equal either way to 2 and 12; segments 3 and 4 are creased, and divided into five rounded and nearly equal ridges; after this, there are six ridges, the front one broader than any other and flattened, the rest being somewhat rounded; 13 ends in two small tapering divergent tails; color of body yellow-green; surface thickly covered with small sharp tubercles placed irregularly, but most dense in certain longitudinal lines, one such on either side of the medio-dorsal dark stripe; one sub-dorsal from head to end of tail; two on the side, and one, more conspicuous, along base, ten lines in all; tails reddish; under side, feet and legs, green; spiracles buff; head obovoid, truncated, the top depressed; on each vertex a little conical process, reddish; surface rough with fine green tuberculations, among which are a few whitish ones, each with short white bristle; ocelli emerald-green in brown rings. Duration of this stage about 13 days.

CHRYsalis.—Length, ♂ .48 inch; greatest breadth at mesonotum and also at abdomen, .18 inch; ♀ (probably) .54 inch, breadth .20; cylindrical, the abdomen stout, conical; the wing cases a little raised on dorsal side; head case very short, scarcely projecting beyond mesonotum, bevelled transversely to a sharp edge, roundly excavated on either side, the top very little incurved; mesonotum rounded, carinated, the sides nearly flat or a little excavated; color green, the edges of carina, wing cases and top of head case cream-color; surface much covered with points and small patches of whitish, not distinct enough to detract from the general green hue. Duration of this stage about 10 days.

In 1882, I carried three larvæ to chrysalis, and all passed but three moults. I received these larvæ from Dr. Wm. Wittfeld, Indian River, Fla., 17th July. He mailed the eggs 11th July, and had obtained them by confining a female over grass. When the larvæ reached me they were in their first stage, and the

1st moult was passed 20th July.

2nd " " 29th "

3rd " " 5th Aug.

2 larvæ suspended 16th "

They pupated 17th "

A third " 20th "

Imago from last chr. (♂) 30th Aug.

(The other chrysalids I put in alcohol.)

But Mrs. Peart carried one larva to chrysalis, and it passed 4 moults.

This came from

Egg laid 7th May, 1882.

Egg hatched 12th "

1st moult 2nd June.

2nd " 15th "

3rd " 3rd July.

4th " 15th "

In chr. 28th "

I have the casts of the face of this larva, which so passed 4 moults, and can compare them with casts from the larvæ raised by myself, calling the former A, the latter B :

A.—Diameter of head at 2nd moult, .023 in. ; B, same stage, .023.

" " 3rd " .04 " " .057.

" " 4th " .065

" " chry. .1 " at chry. .08.

So that A and B were alike at 2nd moult ; B at 3rd was between 3rd and 4th of A, and at pupation was smaller than A. In fact the larva which passed 4 moults was larger than either of mine, and the chrysalis from it measured .54 inch in length, against .48 in the other case. This chrysalis failed to give an imago, but probably it was a female, and it is possible that the difference in number of moults may be sexual.

I have had great difficulty in bringing larvæ of *Areolatus* to maturity, and I may say the same of *N. Canthus*, and in repeated instances have failed when feeding them on lawn grass. The eggs of both species are

naturally laid on coarse grasses, and I found, this season, that by selecting *Dactyloctenium aegyptiacum* the larvæ fed more readily than before and were healthy.

Areolatus is common in Florida and Georgia, and has been taken by Mr. E. M. Aaron on the summit of one of the high mountains of East Tennessee.

CLOTHES MOTHS.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, MAINE.

Nearly a year ago my attention was especially called to the insects which prey upon woolen fabrics, and which are generally known as "clothes moths." In going over the literature of the subject at that time and comparing it with the notes which I had made from time to time, I became convinced that what we have in our books pertaining to these insects is very imperfect and faulty, and that there was need of a thorough revision. This held true, not only of the species which destroy clothing, but also of many other species in the family *Tineidae*.

I therefore obtained, by purchase and otherwise, as large a collection as possible from all parts of the United States—over twelve hundred specimens—and sent them to Lord Walsingham, in England, for comparison with the European species. This collection has just been returned to me, and the notes and descriptions which his lordship has made on it will soon appear in the *Trans. Am. Ent. Soc.*

From the studies thus far made it appears that such of the European species as attack clothing have already been introduced into this country, and the probabilities are that we have no native species possessed of similar habits.

In 1841, Harris's *Insects of Massachusetts* appeared, in which a general account of clothes moths was given, taken from Duponchel and other European works, and including a brief description of a moth attacking white flannel in the cases of the Boston Society of Natural History, which, as he stated, agreed with the description of *Tinea flavifrontella* of the older naturalists. Harris omitted to mention whether or not the larva of this species made a case of the flannel in which it lived. Later editions of Harris's work merely repeat the same thing.

Dr. Packard, in his *Guide to the Study of Insects*, p. 346, described

the clothes moth under the name *Tinea flavifrontella*, Linn.; but Linneus never described a species under this name. Packard has confounded two species in his account in the Guide, and also in his Common Insects, p. 64, as shown by Lord Walsingham. His larva is that of a case-making species—*Tinea pellionella*, Linn., while his imago is that of *Tineola biselliella*, Hum., the larva of which does not make any case. See also Am. Nat. Vol. I., p. 423, and the Report of the Ent. Soc. of Ontario, 1873, p. 27.

Clemens and also Chambers have redescribed the introduced European species as shown in the synonymy below. *Tinea pellionella*, Linn., *Systema Naturæ*, 10th edition, p. 536, 1758, is our only case-making clothes moth, so far as I can ascertain, and although redescribed under other names in this country, it has been easily recognized by European entomologists, from the description of Linneus and the earlier accounts of Reaumur. This species has an expanse of wing from 10–14 m. m. The head is of a dull ochreous color, the fore-wings grayish ochreous, with three fuscous spots, one at the end of the cell, another on the fold, a little before the middle of the wing, and the third on the cell above the last-named spot. These spots are scarcely visible, except in fresh specimens. Hind wings silky gray, lighter than the forewings. The case which this species constructs is well described in Packard's writings mentioned above. This is, in this region, our most common and destructive species, attacking all kinds of woollen clothing, carpets, furs, feathers, etc. I have bred this insect repeatedly, and find that it feeds during the summer but not in the winter, even when kept in a room warmed by a furnace where the heat was uniform day and night. The moths emerge in June and July, and some even as late as August, yet there is but a single generation annually, so far as I have observed.

Tineola biselliella, Hum. Ess. Ent., 3, 13, p. p. 6–13; 1823. This species was separated from the genus *Tinea* by Herrich Schæffer, because of the absence of the maxillary palpi. It has an alar expanse of about 14 m. m. The head is dull ochreous, differing but slightly from that of *pellionella*. Fore-wings pale ochreous, without spots. Hind wings somewhat lighter. This insect does not construct any larval case, but according to Stainton, webs together portions of the substance upon which it feeds into a cocoon before changing to a pupa. It feeds on woollen stuffs, furs, feathers, horse-hair, linings of furniture, dried plants, etc. Packard describes the imago of this species under his *Tinea flavifrontella*.

Tinea tapetzella, Linn. *Systema Naturæ*, 10th ed., vol. I., p. 536, 1758. The alar expanse of this insect is about 18 m. m. Head and face white. The wings black from the base to the middle and white beyond, the black color extending out a little further on the costa than on the hinder margin. The white of the outer portion of the wing is more or less clouded with dark gray, and there is a small black spot at the anal angle, and two or three at the apex of the wing. Hind wings pale gray. This species is apparently quite rare in this country. The larva in Europe feeds on animal matters, pelts, felts, carpets and also on dried plant substances, forming a gallery of the substance on which it occurs, thus destroying much more than it eats.

In 1776 Denis and Schiffermiller published a catalogue of the insects in the Royal Museum in Vienna, giving very brief descriptions of the species, one of which they called *Tinea flavifrontella*, and their description was as follows: "Shining gray moth with yellowish head. Larva unknown." The type in the Vienna collection was long ago destroyed, and from this meagre description it is now impossible to tell what the insect is. Fabricius next used the name in his *Entomologia Systematica*, Vol. 3, part 2, p. 305, (1794), for an insect in the collection of Bosc, and states that the larva feeds on insects and feathers, but it is not certain that he ever saw the type in the Vienna collection, if, indeed, it was even then in existence.

In 1801, Illiger issued a second edition of the Vienna catalogue, and gives not only what is in the original edition, but adds the description by Fabricius, which may not pertain to the Vienna moth at all. In 1821 Charpentier published the notes which he made on an examination of the insects in the Vienna collection, and states that the type of *Tinea flavifrontella* was not in the collection, but at what time it was destroyed I am not able to learn. In 1833 Treitschke published the description of a moth under the same name, giving the credit to the Vienna catalogue, but it is quite certain that he did not know the original type of *Tinea flavifrontella* for it had disappeared long before he made his studies on the microlepidoptera.

In 1823, Hummel described a clothes-destroying moth, under the name of *Tinea biselliella*, which was, without much doubt, identical with the species described by Fabricius, Hubner and Treitschke, but as they had used the name given in the Vienna catalogue for an unknown and per-

haps different moth, the name *biselliella* is now universally accepted, and *flavifrontella* is dropped from the lists.

The synonymy of the above species is as follows :

TINEA PELLIONELLA, Linn. *Systema Naturæ*, Vol. I., X., Ed. 1758.

Tinea carnariella, Clem. Proc. Ac. Nat. Sci. Phil., pp. 257, 258. 1859

Tinea griseella, Cham. Can. Ent. V., p. 88. 1873.

Tinea flavifrontella. Pack. Guide, p. 346 (larva only). 1872.

This is our case-making species, and should be known by the name of *Tinea pellionella*, Linn.

TINEA TAPETZELLA, Linn., *Systema Naturæ* Ed. X., Vol. I., p. 536. 1758.

This is a gallery-making species.

TINEA BISSELLIELLA, Hum. Ess. Ent. 3, 13, p. 6-13. 1823.

Tinea Crinella, Treits Schm. von Eur., B. IX., p. 21. 1832.

Tinea Destructor, Steph. Ill., Vol. IV., p. 346. 1834.

Tinea Biselliella, Zell. Isis. 1846.

Tineola Biselliella, H.-S. Schm. von Europa, Vol. V., p. 81. 1853.

Tinea lanariella, Clem. Proc. Ac. Nat. Sci. Phil., p. 258. 1859.

Tinea flavifrontella, Pack. Guide, p. 346 (imago only). 1872.

This is not a case-making species. It should be known by the name of *Tineola biselliella*, Hum.

NEW MOTHS.

BY A. R. GROTE, A. M.

Copablepharon Longipenne, n. s.

Eyes naked ; tibiæ spinose. Fore wings clear light buff yellow with an outer line merely a succession of minute dots, at usual place of s. t. line. Hind wings fuscous with pale fringes. Head and thorax yellow ; pectus and palpi whitish. Beneath the whitish wings are clouded with pale fuscous. A little slighter than *Absidum* (= *Aedophron grandis* of Strecker). Montana Coll. B. Neumoegen, Esq.

Copablepharon Subflavidens, n. s.

Eyes naked ; tibiæ armed ; fore tibiæ with a very slight claw in addition. Primaries pure light yellow, immaculate. Hind wings pure white,

immaculate. Abdomen white; white beneath. Montana, Coll. B. Neumoegen, Esq. Size of the other species. *C. Album* is also in the collection before me.

Arsilonche Henrici Gr.

After examining specimens of the European *Albovenosa*, not one was the same as *Henrici*, which is not so strongly marked. I conclude that Mr. Morrison has been hasty in pronouncing them the same.

Mamestra Gnata, n. s.

♂. Allied to *vicina* (= *teligera*) but differing by larger size, darker color and the rounded not kidney-shaped reniform. Hind wings white, iridescent, with dark veins. Primaries with straight costa and determinate apices. Dark fuscous gray, with a brownish tint on median space. A pale patch before internal angle, prominent. Reniform with incomplete inner annulus, pale shaded, contrasting, rounded. Orbicular darker, smaller, a little oblique, with a fine pale ring. Head and thorax dark gray. Beneath hind wings white, no marks, costa gray. Primaries gray superiorly with discal point indicated and commencement of a mesial line shaded with white. Arizona. Coll. B. Neumoegen.

Mamestra Glaciata, n. s.

♂. Eyes hairy. Allied to *Leucogramma*. Primaries dusky olive with the lines black, vividly edged with white. Reniform and orbicular white-shaded. A white spot beyond the concolorous claviform, attached to the dark rivulous median shade line. Fringes interrupted markedly with pale. Hind wings blackish fuscous, with white-tipped fringes and faint mesial line, paler at base. Thorax and head mixed with white and fuscous scales, agreeing in appearance with fore wings. Beneath fore wings fuscous, with distinctly checkered fringes; hind wings whitish at base, with a distinct oval discal spot and double exterior shaded lines. A fine basal ray. Arizona. Coll. B. Neumoegen. Belongs to *Dianthoeia*.

This is close to the European *Magnolii*. The orbicular is larger, the olive ground color less apparent, the white more plentiful. Though closely allied, it is unlikely the two insects are the same.

Helotropha Sera G. & R.

This is allied to the European *Helotropha Leucosigma*.

Apamea Inquaesita G & R.

This species is incorrectly cited in my "New Check List" as

"Gortyna quaesita." How the error occurred I cannot now tell. The species of these two genera should read as follows, synonyms omitted :

Helotropha Led.

Sera *G.* & *R.*

Reniformis *Gr.*

Var. Atrata *Gr.*

Apamea Tr.

Purpuripennis *Grote.*

Juvenilis *Grote.*

Nictitans *Esp.*

Inquaesita *G.* & *R.*

Erepta *Gr.*

Immanis *Guen.*

Obliqua *Harv.*

Stramentosa *Guen.*

Thalpochares Fortunata, n. s.

Size small. Front embossed. Vestiture of flattened scales. Aspect of *Patula*. Fore wings deep yellow, shading to whitish over head and thorax, and with a pale terminal even shade line. Primaries with no markings except a prominent broad, leaden-hued, bent median band, edged with pale, resting on inner margin and expiring on cell at about the place of the reniform. Hind wings translucent, stained with yellow; fringes whitish. Beneath the body is white and the immaculate wings suffused with deep yellow. Arizona, Coll. B. Neumoegen.

Thalpochares Perita, n. s.

Allied to *Fortunata*; wings a little narrower. Eyes naked; clypeus full. Fore wings pale yellow to a leaden band situate outside of the pale t. p. line, which is illegible; terminally the wing is clear buff yellow. Hind wings translucent, stained with yellow. Body white beneath. Wings stained with deep yellow. The band on primaries is oblique, rather narrow and expires before costal region. Arizona. Coll. B. Neumoegen.

Melicleptria Celeris Grote.

A true *Melicleptria*, as I find from a fresh example in Mr. Neumoegen's collection. Hind wings brilliant orange red, concolorous. Fore wings with the usual pale blotches confined to a couple of pale spots at middle, vinous purple, slightly overlaid with sericeous. Thorax with the usual silky, olive or yellowish, hair. Abdomen blackish above. It may head the series as arranged in my "New Check List."

Oxylos citrinellus G. & R.

Eyes a little narrower than *Heliothis*, naked, unlashd ; tibiæ spinose ; fore legs with a claw and three outer curved spines, besides the spinules. Only slightly by the armature of the front legs and the narrower eyes and smoother front does this differ from *Heliothis*, and I should prefer not to separate it in future. *Lucens* and *Spinosa* are doubtfully in their right place, and I should prefer to restrict *Heliothis* to *armiger*, *phlogophagus* and *luteitinctus*, *lupatus*, *citrinellus*, *cupes* and *nuchalis*.

Tripudia Gr.

In *T. Versuta*, the lashless eyes are naked ; ocelli ; tibiæ slender, unarmed ; front smooth ; a ridge of scales behind the head. Sub-basal space ochery ; basal dark fuscous ; median again darker, narrow ; a rivulous black median shade ; t. p. line black, roundedly exserted opposite reniform which is defined by a lilac shade ; s. t. line irregular, much shaded before with black, partly followed by a lilac shade ; s. t. space anteriorly ochery ; squamation lustrous ; beneath discolorous with a pale streak along internal margin and some yellow specks along costa ; hind wings broken up with whitish and a dark discal lunule. *Type* Coll. Neumoegen. Whether distinct from *Flavofasciata*, I am not now certain. The species is minute, pyralidiform.

Spragueia Grote.

This genus is so distinct from the European *Erotyla*, with its one species, by the neuration, as I have shown, that to unite it would oblige every genus in the sub-order dependant on neuration, to be subverted. Dr. Herrich-Schaeffer expressed his opinion to me that the two were distinct. The fore wings are narrower, the clypeus differs, the ornamentation is peculiar in *Spragueia*. We have many species ; the genus comes to our fauna from the South.

Matigramma Rubrosuffusa, n. s.

This species is fuscous, the underlying tint is a pale reddish, appearing in the pale red subterminal line. Male antennæ ciliate. A little larger than *Laena*, which is wholly griseous and fuscous. Fuscous lines double, marked on costa of primaires ; s. t. line continuous, more broken into dots on primaries. Fringes indistinctly checkered. Upper surface of wings similar ; the hind wings show a pale streak on submedian space ; fringes on internal margin whitish. Body concolorous. Beneath ashen ;

a fine common angulate dark mesial line. Very indistinct discal dots; an inner line on fore wings; outwardly the wings are darker. Arizona; larva on scrub-oak, chrysalis pruinose (I. Doll, Esq.)

Tripudia Lixiva, n. s.

Size small. Eyes naked. Scales of the body flattened. Palpi incurved; third article exceeding the front. Base of fore wings gray. A very broad median olive brown band, bordering t. a. line outwardly, interrupted at costal region. T. a. line a little waved, pale, emanating from a small black costal spot. A large black costal spot at middle, inaugurating the pale narrow, sinuate median shade line, forming the outer margin of the olive brown band; terminal portion of wing reddish brown, on which the vague reniform is apparent. S. t. line irregular, dark shaded superiorly, waved; terminal space slightly grayish; fringe yellowish, interrupted by a blackish spot opposite cell. Body and hind wings gray. Arizona. Coll. B. Neumoegen.

Allied to *Opiparus*, but smaller, the median fascia broader, the outer half of the wing redder and more like *Basicinerea* in this respect.

Eugonia Vidularia, n. s.

♀ Apices of primaries pointed; outer margin strongly angulate opposite cell; hind wings "tailed." Very pale yellowish. An outer dark narrow line, fainter inferiorly, continued across hind wings. On fore wings the surface is a little darker about the inception of this line and on secondaries without it. At apical excavation the fringe is dark. Beneath still paler, irrorate; a narrow common line and slight discal marks. Disc of thorax buff or darker; body pale. Size of *alniaria*, but slighter. Arizona. Type Coll. B. Neumoegen, Esq.

Cymatophora (Boamira) Dataria, n. s.

♂. ♀. Allied to *Pampinaria*. In the male the median lines are shaded with black, in both sexes propinquitous, very oblique, angulate, followed by an indistinct (♀) or distinct (♂) brown shade occupying the anterior half of subterminal space. S. t. line scalloped, distinctly marked with white in male. Hind wings gray at base (♂), or concolorous (♀). The color of female is more obscure fuscous. Mesial line bent opposite cell. A faint annulus. The outer field beyond the line copies the markings of primaries. Size of allies. Beneath gray, discolorous with discal marks diffuse, blackish, wanting on hind wings in male. Types. Coll. B. Neumoegen, Esq., Arizona.

Lythria Fultaria, n. s.

♂. Aspect and color of *Fidonia*. Front wide, even; eyes naked; ♂ antennæ strongly setose; labial palpi, exceeding the front, loosely haired. Wings entire, roundedly bent at middle. Body slender. Fore wings with alternate fuscous and pale reddish bands; veins a little marked; fringes black, except at apices where they are white. Hind wings dark yellow with black marginal band and a sub-basal line ending the darker basal field; a mesial band enclosing a yellow streak. Beneath fore wings dark yellow with a mesial black line, angulate and touching the black discal spot. A pale apical patch; an outer bent subterminal line beyond which the wing is blackish. Hind wings dull like primaries above, pale reddish brown with two brown bands. Arizona. Coll. B. Neumoegen, Esq. This may belong to a different genus; the colors are those of *Botis subsequalis*. Again here I note the singular way in which the upper wings beneath are like the lower above and *vice versa*. I allude to this in my essay; it must be dependent on the exposure of the surfaces.

Cyclica, n. g.

I refer to the *Larentinae*, a singular large-winged Geometrid with the primaries unusually long and wide and produced apically. Hind wings much elongated; cell closed; veins 2, 3, 4, 5 nearly equi-distant; submedian space wide. Labial palpi prominent. Clypeus uneven; eyes naked; no ocelli; ♂ antennæ serrate, ciliate.

Cyclica Frondaria, n. s.

♂. The form is an exaggeration of *Tornos*, but much wider winged. Fore wings blackish, thinly scaled; paler below median vein, outwardly. Some black and white marks along submedian fold and two or three oblique black apical marks. Indications of transverse bands but all obscure. Hind wings pale fuscous with dark marginal line. Beneath immaculate, very pale fuscous, whitish over hind wings. Size large. *Type* Coll. B. Neumoegen, Esq. Arizona.

Föta, n. gen.

Eyes naked; fore tibiae slender, closely scaled, with a short claw. Clypeus with an exceedingly prominent wedge-shaped protuberance, surmounting the greatly exerted infra-clypeal plate. Body slender, short, untufted. Fore wings amygdaliform, narrow; hind wings wide, full; fringe long.

Fota Armata, n. s.

♀. Tortriciform. Fore wings gray, with a black shade along the cell, connecting the median stigmata and preceding the orbicular. Stigmata concolorous; orbicular round, reniform upright. A long black shade on median space over submedian fold. Lines obsolete. Fine black interspaceal terminal streak. Hind wings pale, with white fringes; abdomen pale, yellow beneath at tip. Beneath pale without marks. Size of *Hadena cylindrica*. Arizona. Coll. B. Neumoegen.

This singular genus seems to me an aberrant Hadenoid form.

Tamila Lucens Morr.

On account of the flattened scales on head and thorax I would refer this species and *Meadi* to *Tamila*. I am aware that the character is slight but by separating the species into the genera *Tamila*, *Heliothis*, *Melicleptria*, *Lygranthoea* and *Anthoea*, we get consonant assemblages of species, agreeing in their different characters. In the Bulletin of the Buffalo Society Natural Sciences I threw them all in *Heliothis*, but there seemed nothing gained by this and the identification of material was thereby rendered much more difficult.

Luxuriosa, n. var.

A form of *Lucens* from Montana wanting the white admixture of scales over fore wings: subterminal space dark lilac—purple; lines very fine, white, contrasting; yellow of hind wings deeper than type.

Cucullia Montanæ, n. s.

♀. Allied to *Asteroides*, but with the collar wholly pale, whitish, edged with dusky. Tegulae also pale, ochrey white; thoracic tuft dusky. Ornamentation like *Asteroides*, but with the ground color pale ochrey; the black costal shades show the three pale ante-apical dots distinctly and they are larger. The stigmata much more distinct, pale, broken by ocher spots. The anal brown streak, distinct against the pale, ochery white ground; no gray. Montana; coll. B. Neumoegen, Esq.

There is no fine black longitudinal hair line at base of fore wings and the teeth of t. a. line seem blunter. As the species are very close in this genus I have little doubt the present is entitled to a designation as such. It is quite distinct in appearance and can be at once detected. Much more distinct from *Asteroides*, than is the European *Asteris*.

Synedoida Insuperata Gr.

♂ Antennæ serrate, ciliate; eyes naked; tibiæ apparently unarmed; thorax thickly hirsute. Palpi exceeding the front, pale gray; pectus blackish. Hoary gray; median field of primaries olive-ocher, defined by the median lines of the usual shape, cut by the shaded brownish median shade, uneven and obscuring the illy defined concolorous reniform. T. p. line shaded outwardly with black below costa. Costal edge carneous. S. t. line nearly lost, indicated at costa. Hind wings fuscous with whitish fringes. Size of related species. Thorax gray; head darker. Beneath unlined, pale gray, irrorate; discal marks present. Arizona; coll. B. Neumoegen, Esq.

OBITUARY.

Charles G. Siewers died at his residence, Newport, Ky., Sept. 6th, in the 68th year of his age. For many years he has been a devoted and enthusiastic student of entomology. He spent much time in rearing the larvae of Lepidoptera, making colored drawings of them through their stages of growth. He collected largely in Coleoptera and was a very accurate observer of habits. It is due to his skill as a collector that some of the rarest species have been recorded as occurring in this locality.

CHARLES DURY.

Avondale, Oct. 4th, 1882.

ON THE MOUTH OF THE LARVA OF CHRYSOPA.

(By William Saunders, London, Ont., read before the A. A. A. S., at Montreal.)

Recently I had the opportunity of watching in a live box, under a low power of the microscope, the seizing and devouring of some plant-lice by the larva of an undetermined species of Chrysopa, and was interested in the manner in which it emptied the body of its victims. The jaws are large, hooked, pointed and tubular, with a small opening at or near the points. Approaching its prey the body of the Aphis is grasped by the hooked mandibles which at the same time pierce it. The Chrysopa larva remains stationary, and proceeds to pump its victim dry. At the base of

each of the mandibles the integuments are dilated into a sac-like form capable of expansion and compression at will, a portion of the thorax is similarly constructed, and it is by the repeated dilating and compressing of these sacs that the fluid contents of the body of the Aphis are transferred through the tubular mandibles to the stomach of the Chrysopa larva.

When the abdomen of the Aphis has been emptied, the points of the mandibles of the Chrysopa larva are thrust in the thorax, and forward into the head in every direction, and in a few moments nothing remains of the once plump plant louse but a shrivelled skin. In the author's accessible, I can find no reference to these elastic bulb-like sacs at the base of the mandibles, nor to the peculiar structure of the thorax, which admits of its expansion and contraction as referred to.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

(Continued from page 151.)

Prof. J. A. Cook stated that from the European march he had taken about 250 cocoons of *Samia Columbia*, and found among them one peculiar cocoon, very similar to that of *Columbia*, which eventually produced a *cecropia*.

Dr. Jewett thought it was probably a case of hybridism, as he himself had taken hybrids of *Gloveri* and *cecropia*.

Dr. Hagen had seen cocoons of *cecropia* so similar to those of *Columbia* that it would be very hard to discriminate between them.

Dr. Hagen also gave a very interesting account of an expedition to the Northwestern Territories from which, in company with Prof. Henshaw, he had just returned.

In the north of Washington Territory he found the forests and country generally in splendid condition, and comparatively free from any insect pests.

In other parts he had found the Yellow Pines most seriously affected by the attacks of *Pieris marsupia* (?), large tracts of forests being entirely devastated—and large trees being attacked as well as the younger ones. The Butterfly appeared there last year for the first time—eggs were found on July 24th. The larva has the habit of dropping from the trees by a thread, a peculiarity only noticeable in a very few of the *Rhopalocerae*.

A tree once attacked never seems to recover, and the only way to check the ravages of the insect is to cut down those trees affected.

In Montana the cattle feed out all the year round on the "bunch" grass, which is of inestimable value to that country. A curious fact to be noticed is that wherever timothy and blue grass is introduced it seems to kill out the bunch grass, so that the advance of civilization may in fact entirely alter the economy of the country.

The grasses do not seem troubled as yet with any pests.

The Colorado potato bug is merely known in certain localities.

The fruit trees are troubled only by flies and ants, so that the territory is nearly free from noxious pests.

Prof. Henshaw said the expedition was one of great interest.

A curious feature was the late hours at which insects appeared to feed, many of them after sundown.

Papilio machaon was found in great numbers.

Carabidæ were found in dry places, whereas in the East they usually preferred moist situations.

The genus *Callopteryx* was also found. This was especially noticeable as it had never been known to occur west of the Rocky Mountains.

After this a considerable time was spent in informal discussion and examination of interesting specimens brought by members from various parts of the continent, and the meeting then adjourned.

THE GRAPE BERRY MOTH—*Lobesia botrana*.

—
BY THE EDITOR.

This insect is an imported species and has long been injurious to grape culture in the South of Europe. The exact period of its introduction to America is not known, and it is only within the past few years that attention has been called to its ravages. When abundant it is very destructive, in some instances it is said to have destroyed nearly fifty per cent. of the crop.

During the past season it has been very abundant in the neighborhood of London, there being very few vines the fruit of which has not been more or less injured. The young larvæ have usually been first observed

early in July, when the infested grapes show a discolored spot where the worm has entered. [See fig. 21, *c*.] When the grape is opened and the

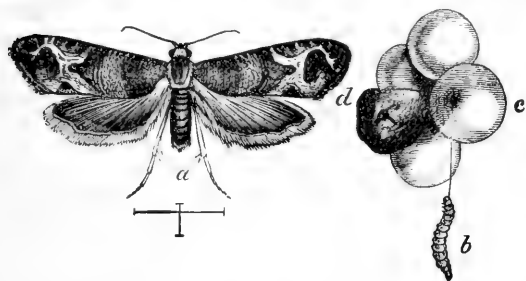


FIG. 21.

contents carefully examined there will usually be found in the pulp a small larva rather long and thin, and of a whitish green color. Besides feeding on the pulp it sometimes eats portions of the seeds, and if the contents of a single

berry are not sufficient, two, three, or more are drawn together as shown in the figure and fastened with a patch of silk mixed with castings, when the larva travels from one to the other, eating into them and devouring their juicy contents. At this period its length is about an eighth of an inch or more; the head is black and the next segment has a blackish shield covering most of its upper portion; the body is dull whitish or yellowish green. As it approaches maturity it becomes darker in colour and when about one third of an inch long is full grown, see *b*, figure 21. The body is then dull green with a reddish tinge and a few short hairs, head yellowish green, shield on next segment dark brown, feet blackish, pro-legs green.

When the larva is full grown it is said to form its cocoon on the leaves of the vine, cutting out for this purpose an oval flap, which is turned back on the leaf forming a snug euclosure which it lines with silk; frequently it contents itself with rolling over a piece of the edge of the leaf, and within such retreats the change to a chrysalis takes place. The chrysalis is about one fifth of an inch long and of a yellowish or yellowish brown color, from which the moth finally escapes.

The perfect insect which is shown magnified, *a*, figure 21, measures when its wings are spread nearly four-tenths of an inch across. The fore wings are of a pale, dull, bluish shade with a slight metallic lustre, becoming lighter on the interior and posterior portions and ornamented with dark brown bands and spots. The hind wings are dull brown, deeper in color towards the margin, body greenish brown. It is said that there are two broods of this insect during the year. We have never

seen them at any other time than in the autumn when the grapes are approaching maturity.

REMEDIES.—As it is possible that most of the late brood pass the winter in the chrysalis state attached to the leaves, if these were gathered and burned a large number of the insects would perish. The infested grapes might also be gathered and destroyed. This insect is attacked by a small parasite which doubtless does its part towards keeping the enemy in subjection.

CORRESPONDENCE.

DEAR SIR: Please insert the following correction of line 12, page 156, August number: For "only these little claws rather than the usual tubercles," read "only three little claws instead of the usual circlet of tentacles."

V. T. CHAMBERS.

DEAR SIR: In preparing my article on *Homoptera lunata* in recent number of the CANADIAN ENTOMOLOGIST I overlooked the article by Prof. J. A. Lintner in his 4th Entomological contributions, where he gives good reasons for thinking *lunata* and *edusa*, and perhaps *Saundersii* but sexes of one species. I had seen his article but at the time of writing it did not occur to me.

G. H. FRENCH, Carbondale, Ill.

DEAR SIR: Mr. A. R. Grote, p. 128, July, states in favor of his opinion that Staudinger's Catalogue did not hesitate to introduce for *Pap. Podalirius* the name *P. Simon*. But Dr. Staudinger has in the same volume, Errata, p. 422, corrected this statement: "*Podalirius* nomen est *vetustius*."

H. A. HAGEN, Cambridge, Mass.

NOTES AND CAPTURES.

PAPILIO CRESPHONTES, Cram.—I saw on the street very recently a magnificent specimen of this beautiful butterfly; it was flying slowly and could easily have been captured with a net. E. B. REED, London.

The Canadian Entomologist.

VOL. XIV.

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No. 10

NEW MOTHS.

BY A. R. GROTE, A. M.

(Continued from page 167.)

Fota armata Grote.

This has somewhat the form of *Stilbia* : the fringes are long on secondaries. A second female like type in size has the black submedian dash wanting, and the filling on cell, but hind wings are like type in being pale fuscous. Base of forewings above pale ochrey shaded. Another has the primary all gray ; *Armata* may be known by its larger size, fuscous secondary and different sculpture of clypeal armature.

Whether the following are really different I do not know ; they appear to be so most certainly.

Fota minorata, n. s.

2 ♂, 2 ♀. Head above and collar pale ochre, paler than *armata*, and this form is $\frac{1}{3}$ smaller. Markings very like ; a pale ochrey shade over submedian space. The grey primaries have all the markings of *armata*, without the broad black longitudinal shades ; the median shade is, however, noticeable and the lines indicated. But the hind wings are pellucid white with soiled costa in both sexes. Armature of clypeus agreeing, except that the central arm has a cup-shaped depression at top ; this I have again gone over and seems to me a good character. Wings a little silky.

Fotella, n. g.

This in form is like *Acosmetia* ; fringes to hind wings long. Eyes naked. Clypeus with a navel-like expansion. Like *Fota* in the silky hind wings which are full, but the primaries are normally shaped, entire, widening outwardly. Body untufted, eyes unlashd, palpi with small third joint exceeding front a little ; tibiæ unarmed. Body slender. Wings full. A *Caradrina*-like form which seems allied to *Fota* ; I think both genera may be related to *Stilbia* and *Caradrina*. Size of *Fota armata*.

Fotella notalis, n. s.

♀. Fore wings olivaceous blackish, something like *Pyrophila glabella*

in color, with a narrow irregular paler terminal space. Lines lost. Reniform marked in white, constricted, the white scales touching median vein. Hind wings fuscous, with paler fringes and paler at base. No markings beneath. Abdomen pale yellowish gray. Arizona. Coll. B. Neumoegen, Esq.

Plagiomimicus Grote.

I called attention some years ago in the Bulletin of the Buffalo Society to the resemblance between this genus and *Polenta*, in the spreading thoracic tuftings, the modification of the clypeus, the shape of the wing and the peculiar pattern of marking, which is so much alike that the two species would be considered congeneric by most observers. I since contradict Mr. Morrison's observation that the fore tibiae are unarmed in *Polenta*; this was the best distinction. The discovery of new forms confirms me that the genera I have grouped under *Stiriinae* are all valid, the modifications of structure being apparent and going closely with the pattern. *Stibadium* approaches *Telesilla*, in frosting and sheen (*aureolum*), and leads to this genus as before suggested. With the new species the group (without absolute value) may fall in between *Calpe* and *Plusia*.

Oxycnemis, n. g.

Vestiture flattened hairs; a tuft behind thorax of broad curved shining scales widening to their tips; abdomen short, untufted. Size small, body slender. Hadeni-form ornamentation. Eyes naked, unlashd. Fore tibiae with the whole short broad joint corneous, terminating in a stout central claw or spine; the legs slender, otherwise unarmed. Notwithstanding its Hadeni-form look, the insect appears nearest to *Triocnemis*.

Oxycnemis advena, n. s.

♀. Gray, neatly lined, with the bright color and ornamentation recalling *Charadra palata*. T. a. line black, distinct, upright, attached to the large open claviform. Discal stigmata light gray, subequal, with included dots. T. p. line faint. S. t. line black with a following white shade, marked with black on costa, far from margin and easily taken for t. p. line, curved in inferiorly; veins terminally finely marked in black. Hind wings pale fuscous, whitish at base. A white costal shade on primaries above from inception of s. t. line over the disk. Size small. Arizona, Coll. B. Neumoegen, Esq.

Ripogenus pulcherrimus Grote.

This insect is so rare that I have never owned a specimen. Since describing it, twenty years ago, or nearly, I took a figure of it with me to England, and, comparing it there with *Eutelia*, I believed it belonged to an allied but different genus. At the time I described it I did not know the European species even by figure. Mr. Tepper has a specimen taken on Long Island which he showed me in his beautiful collection. I left it catalogued under *Eutelia* in my Check List till I could verify my belief and print this note for those who may be fortunate enough to have material to examine.*

Chariclea Kirby.

The European species catalogued by Lederer under this genus are not congeneric. I have separated *Pyrrhia*, which has one or two European and three American species, all closely allied and agreeing also in style of markings and color quite closely. Our only true *Chariclea* seems to me to be *Pernana*. *Cirrhophamus triangulifer*, again examined since my return home, differs by the want of tibial armature, as to which I was uncertain, and in the clypeal structure, as observed by me. The ornamentation is, however, similar, and the untufted abdomen proportionately slender. Figured in my Essay—plate 3.

Trama Griseipennis, n. s.

Larger than *arrosa*, of a pearly gray. The male shaded with fuscous before the curved, flexuous, pale s. t. line. T. a. line broken, dark. Reniform small, indicated. T. p. line followed by a pale shade. Both outer lines continuous on hind wings, divergent. Fore wings pointed at tips. Color and appearance of both wings similar. In male the dark shading continued within the outer line on secondaries. A festooned dark common terminal line, fringes pale gray. Beneath darker, somewhat brownish; faint traces of double outer common lines. Arizona; Coll. B. Neumoegen, Esq.

Anytus Sculptus var. *Planus*.

This is a form of *Sculptus* of which I have now seen two or three examples, one in Mr. Hill's extensive collection, in which the median lines

* Since writing this I have Mr. Smith's valuable observations on the genera of *Noctuidæ*, and note his remarks on this genus. I do not see or receive the Bulletin in which it appeared, but am indebted to Mr. Smith's kindness for the copy.

are lost and the wing is longitudinally shaded with whitish on median space along internal margin, and diffusely beyond the reniform. New York.

Agrotis Hospitalis, n. s.

Allied to *baja* by the black mark, inaugurating s. t. line. Yellow-brown. Half-line black, single; t. a. line black, single, broken, irregularly trembled or denticulate; a dot between these lines on median vein. T. a. line marked on costa: t. p. line appearing as a pale even shade, preceded by broken black scallops not evident, the line itself. Orbicular large, round, paler than the wing, ringed with black, the costa above it pale like the spot itself. Median field shaded with darker brown behind. Reniform ringed with black, kidney-shape, paler than wing, dark or black inferiorly. An interrupted dark terminal line. Fringe concolorous. Hind wings rather pale, silky, concolorous. Palpi dark brown at the sides, tipped with pale brown like front in color. Mr. Hill's collection, N. Y., July at sugar.

Gortyna Impecuniosa Grote.

This is a dark species, almost recalling *nebris*. Dark purple brown with the median field rusty. Stigmata darker-ringed, concolorous, all indicated. A faint apical yellowish patch, inaugurating s. t. line, which is lost or fragmentary. Hind wings dark fuscous. A sharp tuft behind the collar. Mr. Hill's collection, Centre, Sept. 25.

This is allied to *Harrisii*, etc., but, I think, distinct. It is the most obscurely marked of any of the purple-brown species. One male. Size of *Harrisii*.

Rheumaptera Immediata, n. s.

Pale gray with all the transverse markings indistinct except the two black shaded median lines distinct, enclosing the reddish brown median space. Inner line *curved*. The lines are rather neat. The outer with a strong submedian curve, projected somewhat narrowly at median vein. Costal dots distinct. Basal line fine, not very noticeable. Beneath with an evident angulate common outer line, sub-punctate, terminal space shaded outwardly and especially over apices with brown. Discal dots and, on fore wings, a costal dot, marking inner line. Hind wings above pale, with a mesial sinuous line. Under surface darker than upper. Expanse 26 mil. Two specimens, Mr. Hill, New York.

Thamnonoma Quadraria, n. s.

♂. Body slight, wings ample, entire, apices pointed, external margin very moderately rounded. Gray. Median lines sub-parallel, straight, blackish; inner line broken, a little curved, outer straight; the lines tolerably near together; subterminal line most prominent, diffuse, black, edged inwardly by a brownish red shade, its outer edge jagged, denticulate; the line itself runs inwardly opposite cell and approaches outer median line at median vein, thence running parallel with it and approximate to internal margin. A black apical mark; fringes gray. Hind wings light gray. Discal dots distinct on both wings, both above and below, black. Under surface gray, lines obsolete. Expanse 31 mil. Colorado, Dr. Bailey.

This species may be known by the well pectinate male antennæ, the non-falcate primaries and the singular course of the distinct subterminal line and its form and color. It approaches the genus *Lozogramma*, but I think is correctly referred here.

Thamnonoma Perpallidaria, n. s.

♂. Antennæ pectinate. Pale fady ochrey. Two parallel, even, dark ochre median lines, starting from brown costal dots. Subterminal line broken, diffuse, dark. Hind wings very pale, with mesial line indicated at internal margin. Beneath pale ochrey, without marks. Body pale ochrey. Expanse 27 mil. New Mexico. No. 993, Prof. Snow. Smaller and differently colored, but allied to *T. Quadraria*.

Homopyralis Miserulata, n. s.

Small and slight bodied. Dull brown. Median shade black, distinct, waved, upright, touching the small black reniform. Wing paler over median space beyond the shade. T. p. line rounded opposite cell. Before the s. t. line the space is shaded with blackish. Fringes pale dotted. Hind wings concolorous with two divergent mesial lines. Beneath paler, with the discal dot contiguous to the inner of the two divergent lines on hind wings. Body brown. Expanse 20 to 22 mil. Three specimens. New Mexico, Prof. Snow.

Tornos Interruptaria, n. s.

♀. Light gray, a little larger than *Rubiginosus*. The fine black median lines make an oblique loop open to internal margin. Above they make another larger, less distinct loop, its pointed apex curving up to median vein. Hind wings light gray; indication of lines on internal mar-

gin. Body gray. Beneath without dots, light gray or whitish, with dark powderings. Arizona. Coll. B. Neumoegen, Esq.

Tornos Escaria, n. s.

♂ ♀. Fore wings fuscous gray, with a blackish discal lunule. Median lines hardly visible, apparently sub-parallel, oblique, accented on submedian fold by dots. Hind wings whitish on disc. A mesial dot; a fuscous outer band; internal margin grayish, showing commencement of mesial lines. Head and thorax dark gray; abdomen centrally somewhat ochreous; terminally gray. The male is smaller and darker, grayish fuscous; the dots on disk evident. Arizona. Coll. B. Neumoegen, Esq.

Tornos Ochrofuscaria.

♀. Allied to *Interruptaria*, without discal dots. Wholly sordid ochrey fuscous. The lines fine, sub-obsolete. Beneath the hind wings are somewhat whitish, powdery with dark. The entire insect is of this obscure ochrey color, above and below, and should be known by this and the apparent absence of determinate markings. Of *Interruptaria* I have two specimens; when the curious median lines are effaced, the species is known by its gray color and want of discal dots. Of *Escaria* I have two females, one the smaller; the smaller and darker male agrees in the accented median lines on submedian fold and discal dots. Of *ochrofuscaria* I have only one female. Coll. B. Neumoegen, Esq. Arizona.

Glaucopteryx Aurata.

Forewings like *Cumatilis*, with transverse lines and olive shading, but hind wings pure orange. Both wings reddish beneath. It is of the same size as *Cumatilis*, and the markings of primaries, while darker, are so alike that a detailed description is quite unnecessary.

Tamila Tumida Grote.

Notwithstanding its aberrant color, this species belongs more naturally here, as I find from a specimen in Mr. Neumoegen's collection.

Heliothis nuchalis Grote.

I can find no difference that seems to me important between this and the European *Scutosus*.

Hydriomene Replata, n. s.

♂ ♀. Male antennæ ciliate; palpi prominent. Size of *Speciosata*. Fore wings sordid gray with distinct black lines. Extreme base black; a slightly waved and outwardly oblique black sub-basal line. A wide black

band, fainter above, broken and angulate at cell, broader and blacker below median vein, the most prominent marking of the wing. Near to this the inner median line, subsinuate, projected and broken just before internal margin. Outer line roundedly projected over median nervules; the sub-terminal line runs parallel with this, and is joined by a black apical line. Fringes black dotted; a more prominent black mark at end of veins 2 and 3. Hind wings pale fuscous, with whitish, fuscous-dotted fringe, and two faint extra-mesial lines. Beneath pale. Arizona. Coll. B. Neumogen. This species exceeds 30 mil. in expanse, and cannot be confounded with any other. Very different from any of the forms of *Sordidata*, which I unite in the "New Check List," and cannot distinguish.

Hydriomene Reolata is a stout species, which can be known by its whitish ground color of primaries showing a slight sprinkling of brown scales, by the presence of an inconspicuous white spot outside subterminal line opposite the disk and by the wide black band before the inner median line, interrupted or angulated on the cell and less prominent above it on the costa. All the examples agree perfectly.

Eustrotia Flaviguttata, n. s.

A small species comparable with *Secta*. Uniformly mouse gray sprinkled with brown dots which, under the glass, take the course of angulated transverse lines running first outwardly from the brown costal dots. The only marking of prominence is the brown mesial shade which encloses a small yellowish spot on the cell and another less noticeable on submedian fold. A brown costo-apical shade patch enclosing a pale costal dot. A terminal dotted line. In the place of the reniform is a dark dot. Hind wings fuscous. *Expanse* 16 mil. Texas, in my collection.

Eupseudosoma floridum, n. s.

Allied to the Cuban *E. niveum* Gr. Head dark yellow above; clypeus white; a dark line dividing the yellow vertex from the white front. Collar and thorax immaculate white. Fore wings white, slightly iridescent; costal edge dark fuscous. Abdomen scarlet above with dorsal white line; anal segments white. Hind wings reduced, white, a few basal scarlet hairs. Beneath white, fore legs dark outwardly. Florida, A. Conradi, Esq.

This may be same as the Cuban form, but there are no black spots on head or wings. The costal edge is smoky.

Eupethecia Gypsata, n. s.

Clay white. A large brownish-black patch on costa over the cell enclosing discal mark. A costo-apical dark divided patch. External margin marked with brownish twice: opposite cell, and above internal angle. Fringe dotted. Costal edge at base marked with dark brown. Beneath a s. t. pale band, edged with brown bands marked on costa. A discal dot. Fringe of fore wings pale, dark-dotted. Hind wings whitish, with the terminal border broken into lines; mesial lines incomplete; a discal dot; beneath with the mesial lines more continuous. Thorax pale; collar a little darker. Two specimens. Arizona. Coll. B. Neumoegen, Esq. This distinct species is of the size of *Nevadata*.

Pleonectyptera Historialis, n. s.

Allied to *Phalaenalis*. Fore wings varying from olivaceous to ochrey reddish. Hind wings reddish outwardly, pale at base. Beneath washed with red with costa of primaries yellow. Above the fore wings have a large, black, irregularly rounded reniform; two large black dots on costa inaugurate the pale median lines, which are very faint. S. t. line faint. Arizona. Coll. B. Neumoegen, Esq.

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This finishes, for the present, the notes and descriptions I have drawn up for the past year, and part of which I had intended using in my "New Check List." With the latter I tried to make as few changes as possible from existing references at the time (May, 1882) of its being given to the printer. As stated in the Preface, there will be many necessary changes in the future, but the nomenclature is becoming more settled and I issued it in response to many enquiries and requests, and I am glad it has been well spoken of here and abroad. In the *Noctuidæ* there will be here and there species to be degraded to varieties, some genera probably drawn in or their characters more clearly limited, and the position of certain genera changed. In a linear arrangement the sequence must be always not entirely satisfactory. Any improvements based on structural studies must be always welcome. As a whole I think the arrangement in the "New Check List" is more satisfactory than that in previous ones from first to last. As soon as warranted, a new edition will be prepared.

DESCRIPTION OF THE PREPARATORY STAGES OF GPAPTA
COMMA, HARRIS. •

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Conoidal, the base flattened and rounded; marked by 10 vertical ribs which near the base are low, but on upper third are considerably elevated, increase gradually in prominence and terminate abruptly around a small flat space at summit; these ribs are thin and their sides are cut by grooves perpendicular to the surface of the egg; the spaces between them crossed by many fine striæ; color green. Duration of this stage 5 days in April, 4 in July.

YOUNG LARVA.—Length .08 inch; cylindrical, even from 2 to 7, then tapering slightly to extremity; on 2 is a dorsal chitinous patch on which are six tubercles, three on either side the medio-dorsal line, each with black hair; below the patch two tubercles, one above, the other below spiracle; on segments 3 to 13 are two dorsal rows of large tubercles, one to the segment, on the anterior part of same, each with long curved hair, from 3 to 7 turned forwards, the rest recurved; next, a row of small tubercles from 3 to 13; on 3 and 4 these stand in vertical line with the dorsals, but on the other segments they are back of the line of dorsals; a third row from 5 to 13 of small tubercles, in vertical line with the dorsals, and on 2 to 4 these are continued a little below the line of the other segments; on 3 and 4 is a short row, in line with the spiracles, and a corresponding tubercle appears in 13; and below spiracles, from 5 to 13, on the posterior part of each segment, is a minute tubercle; finally, along base of body is a row of minute tubercles from 2 to 13, on 2, 3, 4 one to each segment, also on 13, but on the other segments two to each; from all these tubercles proceed hairs, those of basal row turned down, but of the others, from 2 to 7 turned forward, the rest recurved; color whitish-green; feet and legs green; head rounded, bilobed, the vertices rounded; color dark brown; many black hairs scattered over the surface, curving down. Duration of this stage 4 days in April, 2 days in July.

After 1st moult.—Length .13 inch; color either brown-black, or black with whitish lines at the junctions of the segments; armed with seven rows of branching spines (disposed as described under mature larva); these spines are short, stout, black, and beset with short divergent bristles; in the examples which have white lines, on segments 4, 6, 8, 10, the spines spring from whitish tubercles, on the other segments from black;

in the black examples all tubercles are black ; on 2 is a chitinous band with four small spines in cross row ; besides the seven principal rows, there is a row of minute spines over legs and feet ; feet black ; legs olivaceous ; head round, depressed at top, the vertices a little produced, each bearing a short, thick process, with short spines at top ; color of head and processes dark brown ; many black hairs over surface springing from fine tubercles. Duration of this stage 3 days in April, 2 in August.

After 2nd Moults.—Length .3 to .33 inch ; same shape ; color dark olive-brown or black-brown or reddish-brown, individuals varying ; the spines longer, and at one-third from the top give off branches ; the posterior end of each segment after 2 crossed by two or three fine white lines ; in front of the medio-dorsal row of spines are two oblique divergent whitish bars, one such bar from base of each spine in 1st lateral row on outer side ; the spines vary largely, some larvæ having all the spines black, some have the dorsal and 1st lateral rows on 5th, 7th, 9th segments white, the rest black ; some have white from 4 to 11 ; some have white on 9 only ; on 2 a collar of black simple spines ; head broader than high, the top rather square, not much depressed, the processes larger, but similar to preceding stage, crowned with six points, one in middle, the rest about it ; surface glossy black, with many simple spines, of different sizes, usually all black, but some examples show a few white among the black ; each with long hair. To next moult, in May 3 days, in August 2 days or somewhat less.

After 3rd Moults.—Length .38 to .4 inch ; color black, crossed on the posterior end of each segment with two or three lines or stripes of white, sometimes more or less macular ; according to the breadth of these bands the larva is quite white or otherwise ; the oblique marks on dorsum as before, more conspicuous ; a yellow band runs along base in line with lower lateral spines, and the posterior part of each segment above this band shows an oblique bar, and some white spots and points ; spiracles black in broad white rings ; the spines long, and branching as before ; the medio-dorsal row are always white ; those of 1st lateral row are usually white, but sometimes on 3 are black, or partly black ; some examples have the 2nd lateral row wholly black, others white, or some of the last spines are parti-colored ; on 2 is a collar of simple white spines ; head as before, the white spines predominating largely. To next moult in May 3 days, in August 2 days or somewhat less.

After 4th Moulting.—Length .8 inch ; in three days reaches maturity.

MATURE LARVA.—Length 1 inch ; cylindrical, stout ; armed with seven rows of long, tapering spines, one medio-dorsal, and three on either side ; the dorsals beginning at 5 and ending at 12, the upper laterals run from 3 to 12 ; the second laterals from 3 to 13, but on 4 the spine is below the row, and in line with the spiracles ; the lower laterals from 5 to 12 ; from a little below the summit of each spine rise from three to five slender branches, about a central one which is a prolongation of the spine itself ; the spines of the dorsal and upper lateral rows are largest and longest, and each has five branches, besides one or two lower down, of medium length, and some small spines, each branch and spine ending in a bristle ; the spines of second lateral row are of medium length, with four branches ; and those of the lower row are shortest and have three and four branches ; in the green and white varieties of the larvæ all the spines are whitish or yellow, as well as the branches ; in the black, the spines are yellow, mostly black-tipped, the branches as well, but the spines of the first lateral row are sometimes black to their bases ; so those of second row are sometimes wholly, sometimes but partly black ; 2 has a collar of six simple spines and two others are upon each side, in vertical line ; the color of body varies much ; some examples are cream-white, some greenish-white, with almost no markings, or the markings are obsolescent ; others are velvet-black, the dorsum crossed by white stripes upon the posterior edges of the segments ; with two white divergent bars coming to an angle at the front of each dorsal spine, and running to the anterior edge of the segment ; and with a similar oblique bar from each spine of the first lateral row on the lower side ; along the base is a raised yellow stripe, and from this up to the second laterals the ground is crossed by abbreviated white stripes or patches, particularly on the last half of the segments ; above this the side is black ; but individuals vary in the extent of this black area ; sometimes the ground color is vinous-red ; under side greenish, or honey-yellow, according to the color of upper side ; the spiracles black in broad white rings ; at the base of the second laterals from 9 to 11, or from 7 to 11, is usually a fulvous or orange patch, varying in extent ; feet greenish or black ; legs greenish or brown ; head rather square, higher than broad, with high vertices ; in the light examples the color of head is dull pink, in the dark ones it is black, shining, sometimes with a forked whitish stripe down the front ; on each vertex a short, stout process, cylindrical, com-

pressed in the middle, broad at the top, crowned by five equal, blunt-tipped spines around a sixth in the middle ; each with hair ; these processes are black in the black larvæ, and in the light ones either red or red with black tops ; face and whole head thickly covered with simple white spines of variable length, all white, except that sometimes there are one or two of the longer ones on side face below the vertex which are black, or black and white ; along back of head and down the sides is a row of these spines close set. From 4th moult to pupation 5 days.

CHRYsalis.—Length .8 to .9 inch ; greatest breadth .24 to .26 inch ; cylindrical ; head case high, compressed transversely ; at each vertex a long, conical process ; the mesonotum elevated, the carina very prominent, thin, nose-like, followed by a deep excavation ; wing cases raised, flaring at base, compressed in middle, with a point on the margin ; on the abdomen three rows of tubercles, those corresponding to the dorsal row of the larva small, to the first laterals large and conical, the pair in middle of the series particularly prominent, and those in the excavation silvered, gilded or bronzed, varying ; color variable, many examples being dark brown, with lighter or with yellow-brown, and much reticulated with dark lines ; others are dead-leaf brown ; others are light, up to dead-white shaded slightly with yellow-brown, with a bronze lustre over the wing cases and anterior dorsal parts. Duration of this stage about 7 days.

Grapta Comma is found abundantly in New England and thence through the Northern States to Nebraska ; also through Canada and in Nova Scotia ; and to the South, at least as far as the Kanawha district of West Virginia. In the Northern States the species is two-brooded, in Kanawha three-brooded. It is seasonally dimorphic, the winter form being *Harrisii* (i. e., the form described by Dr. Harris), the summer form *Dryas*, Edw. Both these are figured in *Butterflies of N. A.*, Vol. I. Where there are three broods, the middle one is made up of the two forms. Eggs laid by the hibernating females (form *Harrisii*) in April or May, give *Dryas* in May or June, and this is the first brood of the year. Eggs laid in July by *Dryas* give both forms in August—the second brood ; and eggs laid in September by either form give *Harrisii* in October. The first eggs are laid in April or May, according to the forwardness of the season. In 1882, I obtained eggs from *Harrisii*, tied in bag over a hop spray, 14th April, and from 22nd to 25th May, had therefrom 35 *Dryas*, 17 ♂, 18 ♀. In 1874, the first eggs were obtained 10th May, and the result up to 27th

June, was 34 *Dryas*. In 1875, the first eggs were 14th May, and up to 18th June these gave 19 *Dryas*; no *Harrisii* in either case. In 1869, on 18th June, one ♂ *Harrisii* came from chrysalis, the only instance known to me in which that form has appeared in the first brood. So that in different years, at Coalburgh, there is a variation of at least a month in the laying of eggs by the hybernators, and consequently a month's difference in the appearance of the first brood. In Can. Ent., X., p. 69, I gave the results of rearing the several broods up to end of 1877.

The larvæ, as described, are quite variable, when mature, the color of body being white, green or black; and the black examples vary much in the extent of the white or yellow markings. But neither color belongs especially to one form of the butterfly. Thus, of 50 larvæ, from eggs laid by *Harrisii*, in 1882, but one was white, the rest being black. Of 34 larvæ from eggs of *Harrisii*, in 1874, but 6 had black ground, and the rest were all light, several being cream-white. Of 23 larvæ from eggs of *Harrisii*, in 1875, 10 were white or greenish, 13 more or less black. Of 60 larvæ from eggs of *Dryas*, 1873, only one was white, the rest black. So that there is no apparent connection between the color of the caterpillar and the form of the butterfly.

The caterpillars feed on Hop, Nettle, false Nettle, (*Boehmeria cylindrica*,) and Elm. I have found them at Coalburgh almost always on Hop and *Boehmeria*. The eggs are laid either singly or in small clusters upon the under side of the tenderer leaves, and the young larva eats a hole for itself in the substance of the leaf, and during the first stage feeds about this. For the first two stages it is exposed on the leaf just as the larva of *G. Interrogationis* is, but at the second moult behaves differently from that species, which makes no shelter for itself at any time. I watched three larvæ of *Comma* in Aug., 1882, to learn exactly at what stage they began to protect themselves, placing them as soon as hatched upon a plant of *Boehmeria* set in flower-pot in my room. Very shortly after the second moult they had gotten to the bases of the third pair of leaves from top, two on one leaf, one on the other, and were engaged in drawing the edges of the leaves next base down with silk spun. To effect this they had bitten off the principal rib on either side the mid-rib, very near the edge of the leaf, and had cut quite to the edge. This leaf naturally curves the other way, so that the caterpillars were working at a disadvantage on the convex side. But notwithstanding this, they had, in course of an hour,

bent down the edges and bound them together for one half inch. Next morning they all rested under their awnings, two under one, as at the first, and had fed off the tip end of the leaf. Twenty-four hours later the two larvæ had left what remained of their leaf, now scarcely longer than themselves, and each had betaken itself to another leaf. I had to transfer them to a larger plant, and next day found two under one leaf, again brought together as before. The other was upon the *upper side* of its leaf, and had closed that at the top. Still later this larva had drawn down the top of the plant and was concealed very nearly as much as the larva of *Vanessa Atalanta* is, which uses this same plant. Here it passed 4th moult. So that these larvæ can adapt themselves to circumstances, and cover themselves on the upper as well as the lower side of the leaf, if expedient. I noticed that at the older stages the ribs were not bitten, nor were the edges of the leaf slit, the larvæ being able to draw down the edges without that aid. When lying under the shelter the larvae are at the inmost part, and are coiled up much like figure 6. In nature I do not remember to have found more than one caterpillar under one leaf.

The nearest ally of *G. Comma* is *G. Satyrus* Edw., a species common in the Pacific States to Rocky Mts., and taken even in Ontario. Mr. T. L. Mead captured two examples some years ago, north of London, Ont. *Satyrus* is dimorphic, its other form being *Marsyas* Edw., and the larvae remarkably resemble those of *Comma* in color and markings. So they protect themselves in precisely same manner as do *Comma* larvae, and these are the only two American species of *Grapta* which have that habit, so far as known.

DESCRIPTION OF A NEW SPECIES OF LYCAENA, FROM NEWFOUNDLAND.

BY W. H. EDWARDS, COALBURGH, W. VA.

LYCAENA ASTER.

MALE.—Expands 1 inch.

Upper side purplish-blue, the costal margin of primaries silvery; both hind margins narrowly edged black; secondaries have a marginal series of black points or minute spots; fringes white.

Under side white; primaries have the hind margin edged by a fuscous line thickened at each nervule; a submarginal row of rounded black

spots entirely across the wing, and parallel to the margin ; a discal row of smaller spots in a curve from costa to lower median interspace, the next spot below out of and behind the line ; on the arc a thick bar. Secondaries have an oblong, rounded, fuscous spot at the end of each nervule, but otherwise the edge is white ; a submarginal series of metallic points, each of which is overlaid by orange, and above this a black crescent ; a discal series of black points, following the costal margin from base, and running parallel with hind margin to lower median interspace, after which there are two spots back of the line ; on arc a streak, a dot nearer base, and another below cell.

Body above blue, beneath white ; legs white ; palpi white with many black hairs in front ; antennæ annulated black and white.

FEMALE.—Expands 1.1 inch.

Upper side fuscous, bluish over basal areas of each wing, and on secondaries, over the inner half the wing ; secondaries have a marginal series of large rounded blackish spots, faint towards outer angle, each with a little fulvous on upper side. Under side pale fawn-color ; marked as in the male, but all spots more conspicuous ; and in addition, on primaries, the spots which in the male form the submarginal row, and stand alone, here are the crescents which overlies orange spots, and between these last and the margin is a series of black points. From 1 ♂, 1 ♀ (part of a considerable number) taken by Mr. T. L. Mead, in Southern Newfoundland. The species is near to the Californian species, *L. Anna*, Edw.

LIST OF THE SPECIES OF TRIPUDIA AND GYROS.

BY A. R. GROTE, A. M.

I have described the genus *Tripudia* in the Can. Ent., but the characters are not obvious until we know the neuration, which I am satisfied will give us distinguishing features from *Eustrotia* and *Thalpocharis*. Compared with these the front is narrow and a little bulging ; the vestiture is scaly, and there is a ridge of scales on the occiput. The lashless naked eyes, the slender unarmed tibiae agree with its allies. The wings are entire and there is a velvety band on the primaries, not legible, however, in two minute, pyralidiform species which may not be different, my

flavofasciata and Mr. Edward's *versuta*. The species are only known to me as yet from single examples, and are from the South. *Limbata* has the hind wings orange; the rest fuscous or blackish, silky.

Tripudia Grote.

Type: *Erastria Quadrifera* Zell.

Quadrifera Zeller

Basicinerea Grote.

Limbata Hy. Edw.

Flavofasciata Grote.

Opipara Hy. Edw.

Versuta Hy. Edw.

Lixiva Grote.

Gyros Hy. Edw.

Type: *Oribates Muirii* Hy. Edw.

Muirii Hy. Edw.

TABLE OF SPECIES OF EUCHAETES.

BY A. R. GROTE.

The number of described species of this Arctian genus is increasing, and from my own collections in New York, I do not believe that our Eastern forms are at all well known. Among the most interesting recent discoveries in Arizona is *E. zonalis*, Grote, a form in which the abdomen is banded with crimson and black and unlike the other species in this respect. The following table may assist the identification of the species:

- a. Wings with costa and internal margin of primaries striped.
 1. Stripes crimson; wings dark. *Spraguei* Gr.
 2. Stripes dark yellow; wings dark. *Abdominalis* Gr.
 3. Stripes faint, yellow; wings pale. *Vivida* Gr.
- b. Wings with costa only striped.
 4. Stripe dark yellow; wings dark; abdomen banded. *Zonalis* Gr.
 5. Stripe "pale luteous"; wings dark; abdomen spotted. *Eglenensis* Clem.
 6. Costa yellow to apex; wings pale. *Collaris* Fitch.
 7. Costa yellow one-third its length; wings pale. *Pudens* Hy. Ed
- c. Wings unstriped.
 8. Wings dark; abdomen yellow. *Egle* Drury.
 9. Wings white; abdomen crimson. *Elegans* Stretch.
 10. Wings dark; hind wings with crimson patch on hind margin. *Perlevis* Gr.

Two species, *Inopinatus* Hy. Edw., and *Oregonensis* Stretch, I have not examined; the latter species I have been shown, without making any notes upon it, in different collections made in New York State.

The most unusual species is *Perlevis*, with its partly red secondaries, and which is smaller than the rest and somewhat narrow-winged. *Pudens* is a thinly scaled, whitish form, looking like, but slenderer than *Collaris*. A female specimen of *Spraguei* which I saw in Mr. Von Meske's collection, from Texas, had the stripes tinged with yellowish, not so purely crimson as in my male type from Kansas. *Zonalis*, *Spraguei*, *Elegans* and *Vivida* are, perhaps, the handsomest species in the genus and are not inferior in beauty, from the contrast offered by their colors, to the species of *Arctia*. The brilliantly tinted stripes and bodies are set off by the neutral tints of the wings. I have elsewhere drawn a parallel between this genus and *Ctenucha* in form and color, which is interesting; the metallic sheen of *Ctenucha* is wanting in these soft colored species of true *Arctiidae*.

ARSILONCHE AND LEUCANIA.

BY JOHN B. SMITH, BROOKLYN, N. Y.

During the past two years I have found on the exchange lists of most northern, and all Canadian collectors with whom I have done any exchanging, *Arsilonche albovenosa* Goetze under its synonym *Ablepharon Henrici* Grt., and on their list of "wants" as uniformly appeared *Leucania phragmitidicola* Guen. I always sent for *Arsilonche*, and always received *Leucania phragmitidicola*. The latter is a common insect, but the former is more rare, and it may be interesting to know how the two can be distinguished. Superficially they are very much alike; generically they differ as follows: *Arsilonche* has *lashed* eyes, *Leucania* has them *hairy*; the tongue in *Arsilonche* is weak and short, in *Leucania* long and corneous; the legs in the former are shorter and more compact than in the latter, and the spurs of middle and posterior tibiae are much shorter. The vestiture of *Arsilonche* on thorax and body is entirely hairy, fine and long; in *Leucania* the hair is somewhat flattened, more scale-like and shorter. *Arsilonche* has also the head more retracted, the abdomen longer and the primaries rather more lanceolate. The secondaries in *albovenosa* are pure white, in *phragmitidicola* they are more smoky and have a darker border.

The primaries in *albivenosa* are whitish with smoky lines; in *phragmitidicola* the ground color is a straw yellow, darker on costa, through the centre of the wing and just below the apex; the median vein is white, and in fact all the veins can be distinctly traced as fine white lines. At the end of the discal cell, almost on the median vein, there is a distinct black spot, and there is an oblique row of dark spots—often not very distinct—from the apex to the hinder margin. I have in one instance received a specimen of *L. Harveyi* Grt. as *albivenosa*, and several times *Harveyi* have reached me ticketed *phragmitidicola*. *L. Harveyi* is smaller, has the ground color of primaries paler, and while the pattern of markings is almost identical with *phragmitidicola*, it is readily distinguished from it by the much heavier, clearly defined dark markings, by having several distinct black dots in the discal cell, and by the want of white scales on the veins; the median vein is the only white one, and this is much more distinct than in *phragmitidicola*; the secondaries seem also much darker in *Harveyi*.

As to relative position in the family, *Arsilonche* stands near the head, before *Acronycta*, while *Leucania* (or *Heliophila* according to Mr. Grote) comes after the typical *Noctua* and nearer to *Orthosia* and its allies.

Mr. Grote, in his Catalogue, places *Arsilonche* just before *Leucania*, but it seems much nearer to *Acronycta*, and I consider the place Lederer gave the genus when he described it as more appropriate.

NOTES ON A GALL MITE OF THE NETTLE TREE (*Cellis occidentalis*.)

BY REV. T. W. FYLES, COWANSVILLE, P. Q.

GALL, formed on the under side of the leaf, pear-shaped, half an inch long, forms a cup-like indentation on the upper surface. I have counted eighteen galls on one leaf. One mite in a gall.

MITE, one-tenth of an inch long. Eyes large and protuberant, light red. Antennæ moniliform, ten-jointed—the basal joint and that next it being much larger than the rest. Proboscis for suction. Four undeveloped wings—mere protuberances in the case of some (probably younger) specimens—generally translucent, but in some instances smoky brown. Legs, six in number, hairy, semi-transparent. Abdomen much enlarged, top-

shaped, the three last segments reddish brown. Tuft of terminal spines of the same color. The creature has a gelatinous appearance ; and this, together with its agitation when disturbed, reminds one of Young Blight's description of Old Dolls : " All a-shaking like glue monge." It attains its growth in August and becomes quiescent.

THE PERFECT INSECT makes its appearance in September. To allow its egress the pupa-skin is ruptured from the head to a point beyond the base of the wing-covers. Its appearance is that of a very minute Cicada. Colors light at first, but darkening with exposure. Eyes large, madder-brown in a lighter setting. The facets very distinct, giving the eye a granulated appearance. Three ocelli, like small rubies, one above each compound eye, and one between the plates of the face just above the palpi. Antennæ moniliform, two large and eight smaller joints, as in the mite. Thorax, dark brown above with longitudinal bands of lighter color, amber-colored beneath, mottled with dark brown. Six powerful legs covered with short bristly hairs ; femur much stouter than tibia, and more darkly colored ; tarsus two-jointed. Upper wings large and full, pearl-grey, thickly peppered with black—the peppering leaving a band, towards the lower end, clear. The nervures are brownish amber. Under wings of finer texture, and with no black spots, but in some lights beautifully iridescent ; have three nervures, the inmost indented. The insect is quick in its motions, making a sudden spring like the Frog-hopper.

EARLY STAGES OF FIDONIA NOTATARIA, WALK.

BY L. W. GOODELL, AMHERST, MASS.

EGGS.—Oblong, covered with hexagonal depressions and bright green in color. Length 0.6 mil. ; width 0.3 mil. Duration of egg stage 12 days.

YOUNG LARVA.—Length 2 mil. ; head twice as wide as the body, round and deep ochre yellow ; body dull yellowish green with a faint paler stigmatal stripe.

MATURE LARVA.—Body of uniform thickness, deep green with a narrow sub-dorsal and stigmatal white stripe, and a dorsal greenish-white hair line ; dorsal space pale green ; ventral space yellowish green. Head brownish green with a lateral white stripe which is a continuation of the sub-dorsal stripe of the body. Length at rest 25 to 26 mil. ; when crawl-

ing, 26 to 27 mil. Food plant, *Pinus strobus*. Duration of larva stage, 35 to 40 days. Described from 57 specimens.

PUPA.—Length 9 to 11 mil.; color brown, the spaces between the segments and a dorsal line darker; wings dark green; subterranean.

CORRESPONDENCE.

DEAR SIR: In a recent number of the CAN. ENT., Mr. Reed speaks of *Tityrus* Skipper as scarce about London. Here it is one of our most abundant species, and its larva can be found on the locust trees at almost any time throughout the summer. But this fall I found great numbers of them feeding on a wild trailing vine, in all stages of their growth; this vine may have been their native food plant before they had the locust to feed upon.* Mr. Reed also mentions having found *Clytus pictus*. It is no doubt *Clytus* or *Cyllene robinia* that he refers to, *pictus* being the Hickory *Clytus*, and only found in the spring of the year. There is a good deal of confusion existing about these species, some even questioning if there are two. It is undoubtedly *robinia* that Harris describes under the name of *pictus*. Whether both species were discovered at that time I know not, but Walsh is reported by Packard to have said that the male of *robinia* differs from *pictus* in having much larger and stouter antennæ, and in having its body tapered behind to a blunt point, while the female is not distinguishable at all. With 18 specimens of *pictus* before me, captured between the 17th and 21st of May, 1879, on hickory cord-wood cut the previous winter, and a large number of *robinia*, I note the following differences: In *pictus* the body is uniformly more slender and tapers more behind than *robinia*. In *pictus* the antennæ is decidedly longer, that of the females reaching to the end of the body, and that of the males beyond. The third or W-band on the wing covers is noticeably more delicate than in *robinia*, and quite white in contrast to the yellow of the other's markings, a characteristic I have never seen in any *robinia* I ever met with (and I see them here in hundreds every fall feeding on the Golden-rod), and one which would of itself make it quite easy to pick out my *pictus*, male or female, from amongst any quantity of *robinia* they might be mixed with.'

J. ALSTON MOFFAT, Hamilton, Ont.

*This vine, a sample of which was sent by Mr. Moffat, is *Lathyrus paluster* L., known under the common name of "The Marsh Vetchling."—[Ed. C. E.]

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DESCRIPTION OF THE PREPARATORY STAGES OF GRAPTA INTERROGATIONIS, FAB.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Conoidal, the base flattened and rounded ; marked by 8 or 9 vertical ribs, which near the base are low, but on upper third are considerably elevated, increase gradually in prominence and terminate abruptly around a small flat space at summit ; these ribs are thin and their sides are grooved perpendicular to the surface of the egg ; color pale green. Duration of this stage from 3 to 4 days in summer, in April and early May 10 days.

YOUNG LARVA.—Length 24 hours from egg .1 inch ; precisely like *Comma* at same stage ; cylindrical, even from 2 to 7, then tapering slightly to extremity ; on 2 is a chitinous dorsal patch on which are six tubercles, three on either side the medio-dorsal line, each with black hair ; below are two tubercles on either side ; on 3 to 13 are two dorsal rows of large tubercles, one to each segment, on the anterior part of same, each with long curved hair, from 3 to 7 turned forwards, the rest back ; next, a row of small tubercles from 3 to 13 ; on 3 and 4, these stand under the dorsals, but on the other segments they are behind the line ; a third row of small tubercles from 5 to 13, under the dorsals, and on 2 to 4 is an extension of this row below the line of the other segments ; on 3 and 4 is a short row, in line with the spiracles, and a corresponding tubercle appears on 13 ; below spiracles, on the posterior part of each segment from 5 to 13, is a minute tubercle ; and finally, along base of body is a row of minute ones from 2 to 13, on 2 to 4 one to each segment, also on 13, but on the other segments, two to each ; from all these proceed hairs, those of the basal row depressed, but of the other rows, from 2 to 7 they are turned forward, the rest back ; color at first whitish-yellow, semi-translucent, and some examples have the dorsum crossed by brownish patches alternating with the yellow ; as the stage proceeds the body becomes red-brown, with white on dorsum of segments 4, 6, 8, 10, with variation in

this respect ; head rounded ; color shining black ; many black hairs scattered over the face curving downward. Duration of this stage 3 days in May, 2 in summer.

After 1st Moults.—Length .14 inch soon after the moult, in 24 hours .20 inch ; slender, even ; color red-brown, with indistinct whitish lines ; of these, a wavy line runs with second laterals ; from base of each first lateral is an oblique line outward to the front of the segment, and from each dorsal are two such lines, one on either side ; armed with seven rows of spines, one dorsal, and three on either side, disposed as in *Comma* ; these are short, stout, black, beset at top with short branches, with some shorter spines on the sides, each ending in a black bristle ; as the larva approaches second moult, the bases of the dorsal and 1st lateral spines become white or yellow, or reddish-yellow, while the color becomes more red, and the lines become more distinct ; on 2 is a dorsal transverse row of 4 short, simple spines ; legs and feet dark brown ; head rounded, depressed at top, the vertices a little produced, each bearing a stout, thick, black process, with conical spine at top, and shorter ones around the base of this ; color black, with many black hairs. Duration of this stage from 2 to 3 days.

After 2nd Moults.—Length .24 inch ; color black, the lines as before, with the addition of one running with lower laterals, more distinct, often macular ; spines as before, but variable in color ; in some examples, all are black except the dorsals and 1st laterals on 4, 6, 8, 10, where they are reddish-yellow ; some have the spines on these rows light, except on 9, 11 and 12 ; usually the second laterals are black and the lower row is pale yellow ; in all cases the tips are black ; as the stage proceeds the color of body changes to olive-brown, and the lines become more conspicuous ; head as before, much covered with white simple spines. Duration of this stage from 2 to 3 days.

After 3rd Moults.—Length .5 inch ; color black, with cream-white lines, quite macular ; spines very variable ; some examples have every spine of the upper five rows reddish to reddish-yellow, the lower laterals pale yellow ; some have the dorsals and 1st laterals from 3 to 11 red, the rest and all of second laterals black ; some have the body color vinous • instead of black, with no black spines, the upper rows very red anteriorly, the lower laterals yellow ; the lines yellow ; head either deep brown-red, or decided red in the vinous larvae, the processes red, with spines both

red and black ; the spines on face yellow or white. Duration of this stage 2 to 3 days.

After 4th Moults.—Length .9 inch ; color deep black, the spines often very red, from deep red bases ; the surface much covered with tubercles, from small to minute, which are partly white, partly yellow, with many red ; the lines red, or red and yellow. In 2 to 3 days becomes full-grown.

MATURE LARVA.—Length 1.3 to 1.5 inch ; cylindrical, stout ; color dull black, with white and yellow and red tubercles on the cross ridges ; and longitudinal lines and bands of red and yellow, varying greatly in distinctness ; when most distinct, there is a band along the basal ridge ; a stripe running with second laterals, an oblique line from base of each first lateral outwards to the front of the segment, and one from front on either side of dorsals also to front of the segment ; when the lines are obsolescent, the yellow and red tubercles quite cover the surface ; under side black-brown ; spines in seven rows, one dorsal, three on either side, disposed as in *Comma* ; long, slender, tapering, with several branches at top, one being a continuation of the spine, the others arranged about its base somewhat irregularly ; these are of about equal length in the several rows, and others, which are shorter, are found on the sides of the spines, and are particularly numerous on the upper rows of the anterior segments ; the dorsals have 5 main branches, the 1st laterals 6, the 2nd and lower laterals 4 and 5 ; in most examples the dorsals and 1st laterals are red, except on 3, where they are red with black bases, and on 11 and 12, where they are usually black, the red being deepest on anterior segments ; the second laterals are sometimes all red, and the lower row is always yellow ; over the feet from 2 to 10 is a simple red spine ; on 2 is a dorsal row of six simple black spines ; spiracles conspicuous, black in white rings ; head obovoid, rather flattened, deeply cleft, the vertices high, and each bearing a stout and short black process, ending in a long spur, with five others about its base, each hair-tipped ; the face covered with simple spines and tubercles, some minute ; on each side below vertex are four long spines, black, the rest are mostly white, each with hair ; color either deep red-brown, or red, about the ocelli a large black patch. From 4th moult to pupation, 5 to 6 days.

Chrysalis.—Length 1 inch, greatest breadth .3 to .32 inch ; cylindrical ; head case high, compressed transversely, at each vertex a long, conical process ; mesonotum elevated, the carina very prominent, thin, nose-like, more rounded on the anterior side than in *Comma*, followed by a deep

excavation; wing cases raised, flaring at base, compressed in middle, with a prominent point on the margin on dorsal side; on the abdomen three rows of tubercles, those corresponding to the dorsal row of the larva minute, to the first laterals large and conical, the pair on middle of the series particularly prominent; those in the excavation gilded; color variable, in shades of brown from light yellow to dark, often clouded with olivaceous or lilac; sometimes a dark green stripe on the side of abdomen below wing cases. Duration of this stage from 7 to 11 days, according to the weather.

Grapta Interrogationis is found over the entire United States, except on the Pacific slope, flying from Arizona to Montana and through Canada to Nova Scotia. In the northern States, and probably in Canada, it is two-brooded, but in West Virginia there are three broods, and a more or less successful effort for a fourth, depending on the weather late in the fall. In Florida there are at least four broods, and probably five. At Coalburgh, eggs laid by hibernating females give butterflies last of May. This is the first brood of the season. Eggs laid early in June give butterflies early in July—the second brood. Eggs laid last of July give butterflies in September—the third brood. Eggs laid through September give butterflies in October. Individuals of each brood are emerging for some weeks, say for a month, so that the earlier females may be laying eggs while the later members of the same brood are coming from chrysalis. But in case of the fourth brood, it often can be only the earliest hatched larvae which produce butterflies, because by 1st October we are apt to have frost and cold weather, and the food is thereby destroyed. But in some seasons frost holds off till late in the fall, and then the greater part of the larvae might reach chrysalis. As stated in *Can. Ent.*, x., p. 72, I think it probable that the butterflies of the third brood do not hibernate, but that the continuance of the species depends on the individuals of the fourth brood, usually but few in number. This would account for the species being so rare in this district late in the fall and early in spring as compared with *Comma*, which has no fourth brood. The *Comma* butterflies of the third brood are the hibernators, and are to be seen in multitudes before winter, or in November. Whereas *Interrogationis* then is rarely seen. And yet in midsummer it is as common as is the other species.

Interrogationis is a seasonally dimorphic species, the two forms being also very distinct in both shape and coloration. They are figured in *Butterflies of N. A.*, Vol. 1. The hibernating form is *Fabricii*, but in one

instance, and one only, I have seen an *Umbrosa* early in the year, which must have hibernated. The only hibernating female I have been able to breed from was *Fabricii*, from which I got eggs, 28th April, 1877. The result on and just before 4th June was 21 butterflies, all *Umbrosa*, the first brood of the year. Eggs laid by the females of *Umbrosa* of the first brood have repeatedly produced a mixed brood—the 2nd of the year—but with a majority of individuals *Umbrosa*, as :

	11	<i>Umbrosa</i>	to	6	<i>Fabricii</i>
	26	"	"	no	"
	19	"	"	no	"
	1	"	"	2	"
	14	"	"	no	"
	38	"	"	16	"
	12	"	"	no	"

Total, 121 *Umbrosa*, 24 *Fabricii*.

Eggs laid by the females *Umbrosa* of the 2nd brood have produced a mixed brood, the 3rd of the year, with a larger proportion of *Fabricii*, as :

	63	<i>Umbrosa</i>	to	34	<i>Fabricii</i>
	2	"	"	9	"
	1	"	"	20	"
	1	"	"	5	"
	46	"	"	6	"
	21	"	"	no	"
Larvae found—	65	"	"	4	"
	6	"	"	16	"

Total, 205 *Umbrosa* to 94 *Fabricii*.

So that while in the 2nd brood *Umbrosa* has had 80 per cent. of the whole product, in the 3rd brood the same form has had but 60 per cent.

Eggs laid by *Umbrosa* of the 3rd brood have produced *Fabricii* only, the 4th brood, as :

	No	<i>Umbrosa</i> ,	25	<i>Fabricii</i> .
Larvae found—	No	"	10	"
	No	"	4	"
	No	"	2	"
	No	"	25	"

Also I have recorded in October that no form has been seen by me but *Fabricii*, that many were about, coming to apples in the orchard.

The last brood in Florida, if I may judge by 25 *Fabricii* which emerged from chrysalis, at Coalburgh, in November, 1880, the larvae received from Indian River, as before related, would be all *Fabricii*. It would seem therefore that the species is strictly seasonally dimorphic, the last brood producing *Fabricii*, the hibernating females producing *Umbrosa*, but the intervening broods, like the second brood of *Comma*, producing both forms, but with a majority of individuals *Umbrosa*, or the summer form. This is what might have been expected, when the species became polygoneutic, as the interpolated broods are summer broods. The winter brood holds its own, the summer broods after the first, or original one, are made up of both forms.

In the case of the single *Umbrosa* seen in early spring, of which I have spoken, this may have been an exceptional member of the 4th brood, or a hibernating member of the 3rd.

The larvae, as before described, are very variable. That is, they also are polymorphic, and they may readily be separated into 3 or 4 distinct types, as thus :

1. Body black, finely specked with yellow ; no longitudinal lines on dorsum or upper part of side.
2. Body black, with small spots in place of the specks or dots, the longitudinal lines more or less conspicuous, and either yellow or red, or mixed.
3. Body russet, much covered with yellow spots, giving a pepper and salt appearance, the lines often obsolete.

There are intermediate variations, and there is a great variety in the color of the spines, from deep red and red bases, to yellow, or mixed.

The larvae from Florida were of one of these types only, No. 2, and especially were there none of the russet variety.

The food plants of *Interrogationis* are Hop, Nettle, False Nettle, (*Boehmeria cylindrica*,) Elm, Celtis, and in W. Va. they may be found on all these plants at the same season of the year. But the preference is for Hop and Elm, the first early in the season, the other in August and September. I have near my house many Elm sprouts which are cut down every year, to be replaced in a few weeks by a fresh growth. It is on the tender terminal leaves of these that the female chooses to lay her eggs, either singly or in strings of from 2 to 5 or 6, on the under side of the leaf usually. The egg is not correctly represented in But. N. A., although copied from a drawing made by so good an artist as Mr. Konopicky. It

is too round, and perhaps the example sent for drawing was altered by the alcohol in which it was immersed. The egg really is like that of *Comma* figured on Plate of *Dryas*. The number of ribs varies from 8 to 10. Where a string of eggs is laid, the number of ribs is same in all. It is almost needless to say that the young larvae do not consume their egg shells. A lady correspondent says: "The Graptas scramble through their scuttles in headlong haste, totally regardless as to who may take possession of their late tenements, leaving whole hamlets to prove their presence in the vicinity." The larva attacks the leaf, eating a hole through it, each for itself, and during the first stages feeds about the margin of this hole. During all stages it lives unprotected, except as it lies under the leaf, in contrast with the habit of *Comma*, which after 2nd moult draws the edges of a leaf together at base and finds concealment beneath the awning thus made.

PREPARATORY STAGES OF AGROTIS ANNEXA, Tr.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter .03 inch. Shape globular, the base rather broad, the sides ribbed longitudinally, 12 of these ridges which reach the apex alternating with twice as many more of different lengths. The ridges are connected by slender cross bars, the transverse sides of the included spaces being longer than the longitudinal. The small apical space is punctured. Color white. Duration of this period, 4 days.

Young Larva.—Length .07 of an inch. Color pale grayish-white, a little pinkish on the anterior part. Head and top of joint 1 black. Piliferous spots small, black, the gray hairs arising from each a little longer than the diameter of the body. Legs 16, but the first and second pairs of abdominal, short so that the middle of the body is arched a little in walking. After eating the color of the body is pale grayish green. The piliferous spots, or at least the thoracic, in a single transverse row to each joint. Duration of this period, 8 days.

After 1st Molt.—Length .17 inch. Head brown, the clypeus paler. Color of the body about the same as before, with slight traces of dorsal, sub-dorsal and stigmatal lines, all pale. The piliferous spots regularly arranged, except on the first three joints, where they are in a single transverse row to each joint. Top of joint 1 a little brownish. Legs about as before. Duration of this period, 5 days.

After 2nd Moul.—Length .35 inch. Color pale green with a slight brownish tinge, the dorsal, sub-dorsal and stigmatal lines without this tinge. Piliferous spots as before in position and color, a black hair from each. There is a dark oblique shade on the dorsum through the piliferous spots a little above the sub-dorsal line. Head brown, pale above the mouth; joint 1 a little yellowish above with four spots and hairs in front of the regular row. Duration of this period, 3 to 4 days.

After 3rd Moul.—Length .55 inch. Color of the dorsum drab with a narrow dorsal line a little more distinct than the rest, the dorsal space finely mottled with dull green, the dark shade along the piliferous spots about the same as in the last period. Sides dull green mottled with drab or pale ochre. Sub-dorsal line moderately distinct, the sub-stigmatal line a series of elongate, somewhat lunate spots. The lower half of the sub-dorsal space paler than the upper half. Piliferous spots as before. Head very pale brownish except the upper half of the cheeks, which are brownish black; jaws and ocelli dark brown. Duration of this period, 3 days.

After 4th Moul.—Length .75 inch. Color of dorsum yellowish drab, a whitish dorsal line bordered each side with a blackish line not very distinct. The oblique blackish shade along the course of the piliferous spots is prominent, reaching the border to the dorsal line. Sides grayish green the merest trace of a sub-dorsal line on some of the anterior joints, The region of the sub-stigmatal line yellowish green instead of grayish. Stigmata black, the space in the immediate vicinity of each a little yellowish. Venter and sub-stigmatal space green. Piliferous spots as in the last period. Head of nearly a nankeen color, the front of the cheeks dark brown, the sides mottled. Top of joint 1 brownish. Duration of this period, 5 days.

After 5th Moul.—Length from .90 to 1.00 inch. Color above to near the stigmata greasy blackish gray, with a yellowish drab oblique mark on each joint outside the dorsal piliferous spots, each mark broadest posteriorly and mottled a little with the ground color. On some there is no trace of dorsal and sub-dorsal lines, except on the cervical shield. Sub-stigmatal line pale gray, faintly yellowish. Venter pale greenish gray. Head pale greenish gray, slightly brownish on some, more or less dark brown on the cheeks, this mottled outside.

Mature Larva.—Length 1.35 inches, width of head .10 inch, of middle of body .20 inch. As the time of pupating approaches the colors are

more blended and of a dark greasy gray, though the general marks are the same as at the first of the period. Duration of this period, 12 days.

Chrysalis.—Length .65 inch, length of wing cases from anterior end .39 inch, of leg and antennae cases .40 inch, the latter reaching a little beyond the hind margin of joint 5 of the abdomen. Depth of thorax .18 inch, of abdominal joint 1, .18 inch, of joint 3, .19 inch, showing the chrysalis to be about cylindrical. Anterior part rounded down to the front of the head. The tip of anal joint ending in two short conical points. General surface smooth and shining, but the anterior edge of the dorsal part of joints 5 to 8 very much roughened. Color rather pale brown, the following parts dark brown: eyes, humeri, stigmata, tip of anal joint and the dorsal anterior part of joints 5 to 8. Duration of this period from 25 to 46 days.

About the first of August, 1882, the moth from which the eggs upon which my observations were taken, was captured, and the eggs were deposited August 3rd. The egg and larval history covered a period of 40 days, and the pupal was from 25 to 46 days more, making in round numbers from 2 to 3 months from the egg to moth. I do not know the number of eggs that were obtained, or larvæ resulting, but 39 completed all their transformations, having pupal periods as follows:

6 a period of 25 days.			
10	"	26	"
9	"	27	"
3	"	28	"
2	"	29	"
3	"	30	"
3	"	32	"
2	"	44	"
1	"	46	"

The last were probably prolonged by the days and nights becoming for a time colder. This will give us two broods at least in a season. I am not sure of the way they pass the winter, though from the moths coming out in October, it is probable that they hibernate here as part grown larvæ, though it may be different further north. Their habits are truly "cut-worm," eating almost anything offered them, and hiding in the dirt during the day time. They were fed for the most part on Knot-grass (*Polygonum aviculare*). A few were kept in a glass dish partly filled with

moist dirt, and as they went down in the dirt by the side of the dish to pupate, I could see that the dirt of which the cocoon was made was mixed with web.

NEW TABANIDÆ.

BY JOHN MARTEN, CARBONDALE, ILL.

Sub-genus Therisplexes.—"Eyes pubescent ; ocelligerous tubercle more or less distinct ; eyes (female) with three or four bright green or bluish cross-bands."

T. Californicus, *n. sp.* Length 17 mm. Eyes pubescent, with thin purplish bands. Front yellowish-gray ; callosity nearly square, brownish, shining, prolonged above ; ocelligerous tubercles brownish-black on a black spot. Face and cheeks grayish with white hairs. Palpi yellowish-white with small black hairs. Antennæ reddish ; annulate portion of third joint black ; upper angle prominent. Thorax grayish-brown with the usual gray stripes and golden yellow pubescence ; humerus reddish ; pleura and pectus grayish with long white hairs. Abdomen brownish-black, sides of first four segments brownish-yellow, which color leaves a row of black irregular spots in the middle, largest on the second segment and smallest on the third ; also dark oblique spots on lateral margins. Venter yellowish with yellow pubescence ; darker on the last three segments. Femora black, brownish at the tip ; front tibiæ dark brown, proximal end lighter ; second and third tibiæ darker toward the tip ; tarsi dark brown. Wings hyaline ; costal cell light brown ; faint clouds in cross-veins and bifurcation of third vein.

Described from one female from California.

T. hæmaphorus, *n. sp.* Length 16 to 18 mm. Front brownish-gray ; callosity black, shining, prolonged in a spindle-shaped line above ; ocelligerous tubercle black on a brownish-black spot. Face and cheeks yellowish-gray with gray hairs. Palpi yellowish-white with minute black hairs. Antennæ black, faintly reddish on second joint and base of third joint ; third joint but little excised. Thorax grayish-black with distinct gray lines and whitish hairs ; humerus reddish ; pleura and pectus gray with long dirty gray hairs. Abdomen with broad median band and last three segments brownish-black, sides of other segments fulvous with faint black-

ish spots on lateral margins; a row of grayish triangles on the median band, most distinct on the second segment. Venter fulvous with light hairs, darker towards the tip, and first and second segments more or less dark. Femora black, brownish at the tips; anterior pair entirely black. Tibiæ dark brownish, the anterior pair black at the tip. Tarsi blackish-brown, anterior ones black. Wings sub-hyaline; costal vein slightly brownish, faint clouds on cross-veins and bifurcation of third vein.

Described from two females from California.

T. captonis, n. sp. Length 14 mm. Eyes pubescent, with three purplish cross-bands. Front narrowed anteriorly, yellowish-gray, with black hairs; callosity large, chestnut-brown, shining, prolonged above; subcallus denuded, shining; ocelligerous tubercle dark brown, almost black, and surrounded with black. Face and cheeks gray with white hairs. Palpi yellowish with minute black hairs. Antennæ reddish, annulate portion of third joint black, angle not projecting much. Thorax brownish-black with whitish and yellowish pubescence; humerus reddish-brown; pleura and pectus grayish with white hairs. Abdomen yellow on the sides of segments one to four; a dorsal band and last three segments black; hind margins of segments yellow fringed with golden yellow hairs; venter yellowish with middle of segment one and the tips blackish. Femora black, brownish at tip; first pair of tibiæ black with proximate end brownish; middle and posterior tibiae brownish with black hairs, darker toward tip; tarsi dark brown. Wings hyaline, costal cell yellowish. Female from California.

T. centron, n. sp.—Length 16 mm.

Female. Habitat Colorado.

Eyes pubescent. Front narrow gray; callosity black shining, a detached, spindle-shaped line above; subcallus denuded, shining; ocelligerous tubercle blackish. Antennæ black, slightly red at base of third joint. Face and cheeks gray with gray hairs. Palpi yellowish. Thorax black with dingy black hairs and five gray lines. Pleura and pectus black with gray pollen and hairs. Abdomen brownish-black; a row of equilateral triangles on the middle and oblique triangles on each side of the first four segments; hind margins fringed with whitish hairs. Venter fulvous with black on first segment, lateral margins and last four segments. Wings hyaline; costal cell yellowish-brown, and very faint clouds on cross-veins

and bifurcation of third vein. Femurs grayish-black ; tibiae brown, darker on distal ends ; a fringe of black hairs on outer margins of the second and third pairs ; tarsi brownish-black.

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

The veins of the wings in the moths are usually considered to fall into four main branches. I would, however, consider them to afford only two series ; vein 1 of the German Entomologists belonging to the median series, and vein 12 to the sub-costal series of venules. In describing the neuration of *Euherrichia* (= *Herrichia* Grote non Staudinger) I have accidentally written "sub-median" for "median." Generic characters in the *Noctuidæ* are offered by the disposition of veins 6 to 9 on the fore wings and of the median series on the hind wings, from which vein 5 is sometimes (*Spragueia*) absent. In addition there is the presence of an accessory cell to be noted on primaries, which is caused by the peculiar position and course of the subcostal series of venules.

Genus CONSERVULA Grote.

It is surely not necessary to go over the entire structure in the diagnoses of related genera ; the record of a single distinguishing structural feature should suffice. I have, however, usually recapitulated the characters ; in the present case the entire primaries and even external or hind margin distinguishes *Conservula* from *Brotolomia* Led. and *Trigonophora* Led., ex. Hubn. In Lederer's monographic work several genera are partially but sufficiently characterized. I have followed so excellent an authority in considering secondary sexual characters (e. g. as in *Thecophora*) of generic value. In *Conservula* the body vestiture is less hairy and shorter than in *Euplexia*, which the species approaches in size. While Walker and Gueneé do not usually give the structure of eyes and feet, Ochsenheimer, whose genera are all accepted, gives, as I have shown, no characters at all. Hubner's phrases are usually unsatisfactory, though his genera are sometimes good and always remarkable considering his times. In a monograph all the characters should be gone over, but in descriptive work the main object is to make the insect recognizable and to spare words. I

am not aware of any test by which it shall be decided that a genus is sufficiently characterized. When the species is already known, less words are, I should think, needed. It is better to supplement missing characters in a diagnosis, than to needlessly criticize its author, especially in the case where a good number of genera have been fully and clearly made out by him and his work is largely of a pioneer kind, and often has to be accomplished with borrowed specimens or single examples. The difficulty of being always right is shown by Mr. Smith in putting *Polenta* among genera with unarmed tibiae, while, *per contra*, I wrongly stated as it appears (though hesitatingly) that *Feralia* had no ocelli. There is room for careful work in the *Noctuidæ*, but the species must be fully examined as I have tried to do in the genera allied to *Erotyla*. A good lens, a good or perfect male specimen and a duplicate for dissection, a quick eye and experience are needed. If, with all these, patience and courtesy are possessed by the author, who must also know the literature well, satisfactory work cannot fail to be accomplished. Even with all these the student will be disappointed if he expects to produce a "Synopsis" that shall be correct and complete, in a short time. We probably shall have to classify nearly 2,000 kinds of *Noctuidæ*; I have examined or described about 1,200.

Genus PLATYSAMIA Grote.

Hubner's genus *Samia*, erected in the Verzeichniss for species incorrectly associated, and with a diagnosis devoid of characters of value, is used by anti-Hubnerists instead of *Platysamia*, a term fully explained and correctly limited by me to the three or four species, *Cecropia*, *Gloveri*, *Columbia* and *Ceanothi*. Upon what ground this is excused does not appear. It is not consistent; and can only be done by those who give to Hubner's genera the same value as those of scientific writers. Even in this case the procedure is doubtfully defensible. In using Hubner's genera I have been often guided by the prior use of the rejected term, *i. e.* in preferring *Lithophane* to *Xylina*, *Eustrotia* for *Erastria*, etc., both *Xylina* and *Erastria* being previously proposed by Hubner for different genera from those to which Treitschke and Ochsenheimer gave the terms. The entire question of Hubner's genera has been treated in a personal way, and every attempt I have made to compromise the matter has been met by unnecessary insistence on unimportant points. As it stands now, and taking the "Brooklyn List" as an example, Hubner seems only to be

used where his names overthrow a genus proposed or adopted by myself. Mis-statements are made to sustain this view, as, for instance, when *Cressonia* is made synonymous with *Polyptichus*, whereas we originally showed that *Juglandis* was cited by Hubner with a number of species not properly associated with it, and no name had yet been used for one species which is unique as to structure and has no congener; Mr. Strecker's *Pallens* being based on the pale female variety, and Mr. Butler's *Robinsonii* being only large specimens of our somewhat variable and most interesting insect, first described by Abbot and Smith.

Genus PSEUDOHASIS G. & R.

Mr. Henry Edwards, who has made many interesting observations of the larvae of Californian moths, informs me that he knows the larvae of both *Eglanderina* and *Hera* (= *Pica*), and that they are unquestionably different. The synonymy adopted in my "New Check List" is taken from an article of mine published some years ago in the CANADIAN ENTOMOLOGIST. Doubleday's specimen, described by Harris, is presumably the same as that deposited by him in the British Museum and made afterwards the type of *Pica*. Audubon's figures have no real bearing on the synonymy of the two forms.

Genus EULEUCOPHAEUS Pack.

Eyes naked; clypeus moderately broad, with coarse dependant vestiture. Male antennae pectinate to the tips, median vein three branched. Wings entire. Forewings pointed at tips; outer margin even. I cannot separate *Tricolor* generically from *Yavapai* and *Maia*. We may follow Dr. Packard and regard the insect as a faded species, owing its color to its peculiar environment, but it is a faded *Hemileuca*. The type of *Maia* and *Nevadensis* departs too little to consider it different; the head is imperceptibly more sunken, the naked eyes almost lost under the dependant vestiture. The pattern of *Tricolor* essentially agrees with that of *Yavapai*. I should therefore consider *Tricolor*, *Yavapai*, *Juno*, *Diana*, *Grotei*, *Nevadensis* and *Maia* congeneric and refer them all to *Hemileuca*. After carefully examining the satiny white *Leucophaeus Neumoezeni* Hy. Edw., one of our most beautiful Bombyces, I find that the head is freer, more prominent than in *Hemileuca*, the front a little narrower, the vestiture shorter and not so overhanging. The male antennae are provided with shorter pectinations. They are in both sexes testaceous, while in *Tricolor* they are brown-black as in the other *Hemileucac*. The pattern of ornamentation

is different. We have here a common extra-mesial black line, and the appearance is more *Saturnia*-like. There are two spots on the cell of forewings, while in *Hemileuca* we have only one. These characters are sufficient for at least a subgeneric division, and I propose to call it *ARGYRAUGES*, from the sheeny white wings. While in *Hemileuca* the colors are dull, in *Argyrauges* the fore wings especially are glossy and the colors bright. In *Argyrauges* the wings seem a little broader and fuller, but they hardly differ from *Maia* in this respect. The squamation of the wings is of a different character. The neuration, so far as I can observe it without denuding the wings, seems essentially the same in all these forms. There is a tendency in *Maia* and *Nevadensis* to vary in a different direction from the other forms. So far as I recollect, Dr. Hopffer's male and female types from Texas, in the Imperial Museum at Berlin, his *H. Grotei*, is more like *Maia*, though opaque, than the type of *Yavapai*. It was the first of the species, allied to *Maia*, to be described. While *Nevadensis* seems to be hardly more than a variety of *Maia*, I have never seen either *Juno* or *Diana*, but, from information, it seems likely that they are the same. Is *Diana* not the same as *Grotei*?

HYPERCHIRIA ZEPHYRIA Grote.

♀. Fore wings blackish fuscous, very dark, with an even white stripe from apex to middle of inner margin. Hind wings bright yellow in the disk with a large ocellus like *Io*: the yellow field is confined by an outer black line; terminal field pale fuscous shaded. Size of *H. Pamina* or a little larger, allied to it by the pale fawn abdomen shaded broadly above with red. The male differs by the abdomen all red above. The base of secondaries show longer pink red hairs. Beneath discolorous fuscous, with white discal dots surrounded by black on primaries. Thorax fuscous; marked where the wing touches the sides with white. New Mexico. Prof. F. H. Snow.

This is a notable addition to North American Bombyces.

MARMOPTERYX SPONSATA, n. s.

Above very pale ochrey, silky, immaculate except that the white bands of the under surface are reflected; fringes white checkered with brown. Beneath primaries as above; costa and apices yellow, strigate with red; a whitish band interrupted before vein 4 at extremity of all very vaguely indicated. Hind wings yellow strigate with red except for a space on internal margin before the band, where they are blackish. A broad white

band broken superiorly and interrupted at the binding; it appears as a spot again above the white discal spot. Body light ochrey above, white beneath. Expanse 30 mil. New Mexico, Las Vegas. Prof. Snow.

This must be allied to *Formosata* and *Dryadata*; it differs from the latter description in the color not being "russet" and in the interrupted mesial band beneath. Smaller and paler than *Seifferti*. No. 1015.

AGROTIS DOLLII, n. s.

♂ ♀. Male antennæ pectinate, ciliate. Eyes naked, unlashd. Tibiæ all armed. Labial palpi with spreading hairs. Base of legs and thorax beneath pilose. In appearance allied to the *Lagena-Vernilis* group, but not unlikely best placed near *Rileyana*. Gray washed with rusty ochreous. The ♀ shows the pale claviform spot. There are rusty cuneiform marks before the s. t. line; the terminal space is darker; median space grayer than the rest. The rusty ochrey paler tint obtains over subterminal space. Orbicular small, sagittate, pointed outwardly. Reniform small, upright, scroll-shaped, flecked with white on median vein. T. a. line with large teeth; t. p. line denticulate; both lines single, faint dark gray, rather approximate. Thorax rusty gray. Hind wings white in both sexes; veins incompletely marked; fringe white. Arizona. Coll. Mr. B. Neumoegen. I name this fine species for Mr. J. Doll, who collected it in the San Francisco Mountains. Its colors are not distinct, but they are harmoniously blended, the markings easy to recognize the species by, and it is a well-sized and notable addition to our fauna.

AGROTIS NIVEILINEA, n. s.

♂ ♀. More robust than *Ridingsiana*, with white secondaries like *4-dentata*, stouter than this or *Cicatricosa*. A white line crosses the tegulæ, parallel with the white streak on subcostal vein. Thorax fuscous. Color varying to rusty fuscous, the female and most of the males tend to be pale. Median vein narrowly striped with white. A rusty stain on the subequal stigmata. White dentate shades accompany more prominently the black veins 3 and 4, and less so veins 6 and 7. Median lines black, lunate, relieved by rusty shades. Hind wings white with terminal line and white fringes. Expanse 35 mil. Arizona, Mr. Doll. Nearly a dozen examples.

HELIOPHILA RIMOSA, n. s.

♂. Fore wings hoary gray, something like *Ligata* in color; irrorate with dark speckles, and with a faint warm shade reminding one a little of *Unipuncta* in these respects. Allied to *Commoides*: no lines or spots

visible except that there is a continuous series of excessively minute sub-terminal dots, and the median vein is faintly marked with white and edged with black, the white color accentuated at base of 3rd and 4th m. nervules. Hind wings pale gray, whitish; veins soiled. Beneath a blackish shade marks the inception of s. t. line on costa, and the median vein is shaded at base of nervules. Hind wings with costa darker; no lines or spots. Face and pectus a little smoky; fore tibiae pale outwardly. Thorax gray; abdomen paler. Eyes hairy. *Expanse* 34 mil. Kittery Point, Mr. Thaxter.

HADENA HAUSTA, n. s.

♂. A small species related to the European *H. Strigilis*, but with the dark shade not extending over the reniform, which with the s. t. space is grayish. Deep brown from base to t. p. line except over reniform, beyond which the geminate t. p. line is exerted roundedly. Terminal space narrow, ferruginous. A costo-apical light-brown spot on s. t. space. Fringes dark, finely cut with pale. A black mark in place of claviform spot, crossing median space. Median lines double, indistinct. Hind wings pale fuscous, with mesial line; beneath with distinct dot and a fine dark line. Anal hairs somewhat yellowish. Head and thorax dusky brownish. Smaller and darker than *H. Modica*. *Expanse* 21 mil. Kittery Point, Me. Mr. Thaxter.

ZOTHECA VIRIDIFERA Grote.

Allied to var. *Viridula* of *Tranquilla* in color and size. The median lines are nearer together on internal margin. An olive-green patch on cell between the concolorous obsolete stigmata; another larger and paler fills the median space below s. m. fold to internal margin. Transverse lines single, olivaceous; t. p. exerted over median veins; s. t. marked only on costa. General color a faded pale olivaceous; hind wings paler with exterior line. Arizona; coll. B. Neumoegen, Esq.

SPRAGUEIA SORDIDA, n. s.

An obscurely colored species, with the fore wings rather narrower than usual. Primaries dark colored, fuscous brown, broken by pale scales, the most prominent mark a pale yellowish costo-apical spot, set in a deep brown pre-apical shade. The base is olive fuscous to a deeper brownish transverse anterior band; the disc is broken with pale scales to costa enclosing a brown mark. The whole very indistinct. Hind wings silky fuscous, deeper shaded terminally. Beneath silky fuscous; costa of pri-

maries narrowly pale yellow and the light yellow costo-apical spot repeated; internal margin pale. Texas. *Expanse* 15 mil. In my collection.

No one who has carefully examined our dozen species of *Spragueia*, and carefully dissected, as I have done, all but two or three, observing the neuration and the narrow wings, can fail to consider the genus valid and essentially different from *Erotyla sulphuralis* of Europe.

(To be Continued.)

CORRESPONDENCE.

DEAR SIR: The unusually mild and balmy weather that we have been enjoying for the last week has made it an easy task for the Entomologist to neglect his cabinet and correspondence, even now, in the very heart of the exchanging season, and go out into the woods in search of treasures. Thus many a luckless *Vanessa* or *Grapta*, beguiled by the warm, seductive sun from her winter quarters, to have a last aerial promenade before her long cold nap, has found her way into our collections. The morning of Thanksgiving Day here (9th Nov.) seemed to outdo all its fellows in its efforts to charm grumbling mankind, and seemed to insist on every one being thankful and happy. To the lover of flowers the woods provided several autumn blossoms of such flowers as *Viola blanda* and *V. Canadensis*, late blooms of *Solidagos*, *Achillea millefolium*, and stunted Asters whose heads had been broken or eaten off by cattle, but who were yet determined to have their look at the world. Among the damp trees the gauzy-winged male moth of the canker worm could frequently be seen hurriedly flying from tree to tree in search of his wingless wife. On the walls of a house several specimens of the curious little Hammer-headed Fly, *Sphyracephala brevicornis*, were taken. A fine specimen of *Vanessa Milberti*, which came to peer at me by settling within a couple of feet of my head, reminded me of the following, which formerly appeared in the Dublin Penny Journal, and which, as such literature is not at all common, I thought might be entertaining to some of the readers of the ENTOMOLOGIST:

“At the last meeting of the Entomological Society, Feb’y 5, 1844, a beautiful specimen of *Pontia rapæ*, evidently just disclosed from the chrysalis, was exhibited by F. Bond, Esq., which he had captured during the preceding month.”

Child of the Summer, what dost thou here,
 In the sorrow and gloom of the weeping year?
 When the roses have withered that bloomed on thy birth,
 And the sunbeam that nurs'd thee has passed from the earth ;
 The flowers that fed thee are frozen and gone—
 Thy kindred are perished, and thou art alone—
 No one to welcome—no one to cheer—
 Child of the Summer, what dost thou here ?
 Yet 'tis sweet thy gossamer wing to view,
 Revelling wild in the troubled blue—
 Heeding nor rain, nor snow, nor storm—
 Buffering all with thy tiny form.
 Even thus the hope of our summer days,
 In the heart's lone winter gaily plays—
 Thou art the type of that hope so dear—
 Child of the Summer ! thou'rt welcome here !

Welcome 'mid sorrow, and gloom, and showers.
 Emblem of gladness that once was ours—
 Emblem of gladness that yet will come,
 When the sun-bright ether will be thy home ;
 And myriads of others as bright as thou,
 Will revel around us—all absent now :
 Emblem of hope to the mourner dear,
 Child of Summer ! thou'rt welcome here !

Ottawa, Nov. 13th, 1882.

JAMES FLETCHER.

DEAR SIR : On the 16th of August last I captured in our orchard a beautiful female specimen of *Papilio cresphontes* Cram., in perfect condition and evidently not long emerged from chrysalis. Some days later (Aug. 22) a specimen was seen and pursued without success, and on the 29th another very large female was taken. As one of the food plants of the larva, Prickly Ash (*Zanthoxylum americanum* Will.) is abundant here, I think they must have bred in this locality, which is about fifteen miles south of Montreal. I think this is the first record of this butterfly being taken in the Province of Quebec. *Euptoieta claudia* Cram., another butterfly rare in this latitude, was taken by me August 15, 1874, near a hop-field, and is now in the collection of the Montreal Nat. Hist. Society. I mention this as Mr. Edwards gives Canada no credit for this species in his useful Catalogue.

JOHN G. JACK.

Chateauguay Basin, P. Q., Oct. 29, 1882.

BOOK NOTICES.

An illustrated Essay on the Noctuidæ of North America, with "A Colony of Butterflies," by A. R. Grote, A. M. Lge. 8vo., pp. 85. Published by John Van Voorst, Paternoster Row, London, Eng.

This little volume is beautifully got up, printed in bold type on fine paper, and illustrated by four excellent colored plates on which forty-five species of Noctuids are figured. These moths have been previously described in various works, but have not been figured before, and appear to have been selected to adorn this handsome little book on account of their striking beauty; they are the gems of the genera to which they belong and well deserve to be thus made better known. Each specimen is numbered and accompanied by a brief reference or description.

In a preface of 23 pages the author gives a "brief *résumé*" of the sources from whence he has drawn his information; an account is also given here of the life history of the Cotton Worm from the egg to the perfect insect. It is to be regretted that the author should have marred this section of the work by a personal attack on Prof. Riley, an Entomologist who has done so much good work in Economic Entomology. It seems to us most unfair, whatever the provocation may be, to introduce personal reflections of this sort in a book where the party referred to has no opportunity of defending himself or of an explanation which will reach the same readers. Notwithstanding this defect, the little volume will commend itself for its excellencies otherwise, to all those who are interested in the study of the Noctuidæ, as a valuable and beautiful contribution to this department of Entomology.

Transactions of the Ottawa Field Naturalists' Club. No. 3, 1881-1882; 8vo., pp. 66, with two plates.

We commend this record of the work of the Ottawa Field Naturalists' Club to all those who are interested in Canadian Natural History. In addition to the excellent address of the President, James Fletcher, Esq., it contains reports of the work accomplished by the Geological, Botanical and Entomological branches of the Club; a list of the birds found in the vicinity of Ottawa, and addresses which have been delivered on various natural subjects at the soirees held by the Club.

The Canadian Entomologist.

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No. 12

ENTOMOLOGY FOR BEGINNERS.

THE POPLAR DAGGER-MOTH—*Acronycta lepusculina*, Gueneé.

BY THE EDITOR.

The caterpillar of this moth is often very destructive to poplar trees, and more especially to the foliage of the cottonwood tree in the west. It is, when full grown, an inch and a half or more in length, with a black

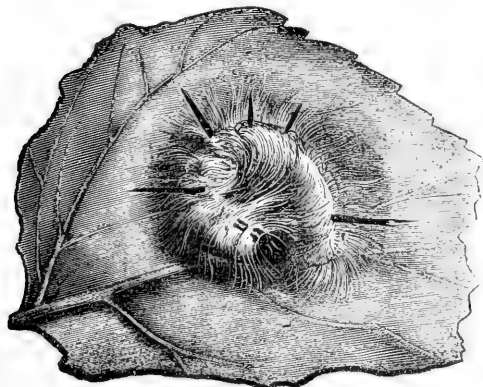


Fig. 22, after Riley.

head, and its body clothed with long, soft yellow hairs, from amongst which arise along the back five long pencils of black hairs. When at rest it curls itself up on the leaf as shown in figure 22.

When full grown the caterpillar spins a pale yellow cocoon of silk interwoven with its own hairs, hidden in some sheltered spot, and there changes to

a dark brown chrysalis, from which in due time the moth appears.

The perfect insect measures when its wings are expanded about an inch and three-quarters across, see figure 23. Its wings are gray varied with dark brown dots and spots and shadings. Near the hinder angle of the front wings is a rather conspicuous spot not very distinctly shown in the figure, resembling the Greek letter *psi* placed sidewise. There are two broods

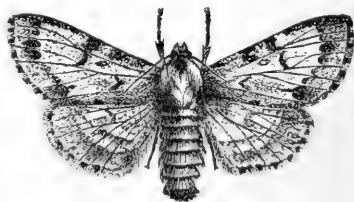


Fig. 23, after Riley.

of this insect during the year; the moths of the first appear in June, deposit eggs which produce larvæ that reach their full growth, pass through

the chrysalis stage, and from which moths emerge about the end of July. The second brood of larvæ are found about the last of August and throughout September; they become chrysalids late in the season, and pass the winter in the chrysalis state.

THE LIME-TREE MEASURING WORM—Hybernia tiliaria Har.

The larva of this insect is a yellowish looper or measuring worm with a reddish head and ten wavy black lines along the back. It is shown in

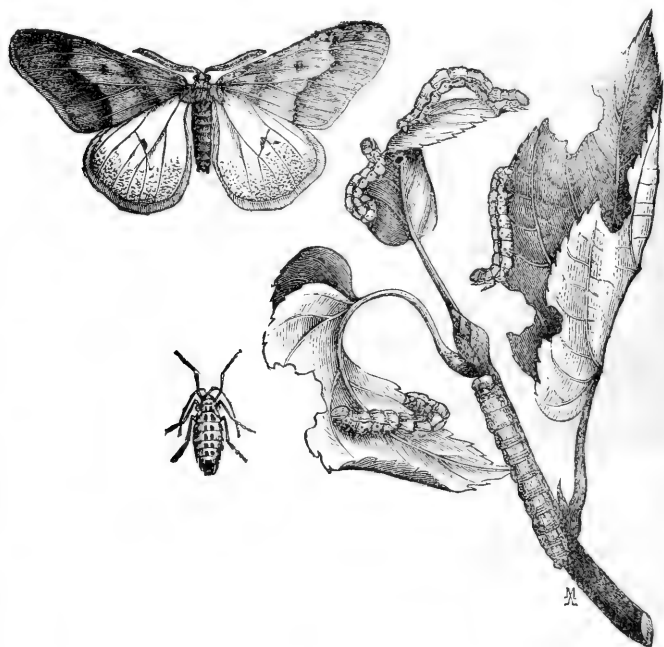


Fig. 24, after Comstock.

figure 24, in different positions. It is hatched early in the spring and completes its growth about the middle of June, about which time it is often very destructive to basswood, elm, hickory and apple trees. When ready for its next change the larva lets itself down from the tree by a silken thread and buries itself five or six inches below the surface of the ground, and there changes to a chrysalis from which the moth usually

escapes the following spring. Occasionally some of the moths appear in October or November, but this rarely occurs with us.

The male moths have large and delicate wings and feathered antennæ, as seen in the figure. The fore wings, which measure when spread about an inch and a half across, are of a rusty buff color, sprinkled with brownish dots, with two transverse wavy brown lines and a central brown dot. The hind wings are pale with a brown dot about their middle.

The female, also shown in the figure, is a wingless, spider-like creature, with slender thread-like antennæ, yellowish white body, sprinkled on the sides with black dots, and with two black spots on the top of each segment excepting the last, which has only one. The eggs are oval, of a pale color, and covered with a net-work of raised lines.

LONG STINGS.

BY FREDERICK CLARKSON, NEW YORK CITY.

In the May number of the CANADIAN ENTOMOLOGIST there is a very interesting paper under this caption, contributed by Mr. Harrington, giving an account of the habits of the *Rhyssa atrata* and *lunator*. These Long Stings the past summer were very abundant at Oak Hill, the residence of Mr. Herman T. Livingston, in the township of Livingston, Columbia Co., New York, and furnished me with a good opportunity of studying their habits. While I agree with all that has been so well observed and so cleverly presented by your correspondent, I am somewhat disposed to differ from the commonly accepted opinion that these insects deposit their ova on the larvae of wood-borers. My experience has demonstrated that while it may be a fact that these insects deposit their ova on the larvae of the Uroceridae or other borers, they do not commonly do so. In every case that came under my observation, the long ovipositor, instead of penetrating through the burrow of a *Tremex* or other wood borer, entered through wood that had not been previously attacked, and though I failed to discover the egg deposited, I am very much of the opinion that the deposition is oftentimes, if not generally made regardless of the contact with a larva. My observations were necessarily confined to such visitations from these insects as were made to a somewhat decayed stump of a beech tree, for though there were a

number of oaks and other trees close by, their choice was for the beech, to which both species were constantly arriving and inserting their long ovipositors. At the close of each day I cut off, to the depth of six inches, such portions of the stump as had been attacked, but failed to detect in any of the cuttings either the burrow or larva of *Tremex* or other larva. I also noticed that the wood as exposed by such clippings as I had made, attracted the greatest number of these insects. I regard it therefore a matter of considerable doubt if either the *atrata* or *lunator* commonly deposit their ova in the body of wood-boring larvae, and it seems to me that if these ichneumon larvae are carnivorous, they must possess the power of boring in search for their food. I do not suppose that these insects perform the great labor of inserting their long ovipositors upon the merest chance of meeting with a larva, but rather that they deposit their eggs at every insertion, my observations abundantly proving that they are not governed by any instinct in the selection of particular spots, so far as regards the presence of larvae.

NOTES ON THE OCCURRENCE OF SOME SPECIES OF UROCERIDÆ.

BY W. HAGUE HARRINGTON, OTTAWA, ONT.

Although my collections hitherto have been chiefly of Coleoptera, I have, as opportunity offered, captured specimens in other orders, and among those thus taken during the past season are representatives of a few species of the Uroceridæ. I wish now to record a few brief notes on these—the more readily because so little regarding this group has been published in the ENTOMOLOGIST.

1. On the 25th of June last I captured upon a recently dead maple tree, near my house, two rather small insects, of which the larger had its ovipositor inserted in the bark. They proved to be two female specimens of *Xiphydria albicornis* Harris. One was half an inch long, the other five-eighths.

2. About the same date I also found upon a maple another female, which may be only a variety of those just mentioned, or, possibly, a distinct species. The antennæ are *dark*; the head has two scarcely perceptible white dots; the legs are much yellower, and only four of the abdominal segments are marked with white, the dots being very small. It may be *mellipes* of Harris, which he describes as differing chiefly from *albicornis* in having "only four white spots on each side of the abdomen." Length as given by Dr. Harris, four-tenths of an inch; of my specimen five-eighths of an inch.

3. In looking over my summer collections a few days ago, I discovered an insect which is evidently a male of one of the preceding insects. Unfortunately it had been hastily pinned without labelling, so that I cannot give the place of capture or the precise date, which, however, must have been in June or July. It is small, being barely three-eighths of an inch long; head of a clouded yellowish-white color, with a dark brownish stripe on the vertex; antennæ dark; thorax chiefly white beneath, and with two V-shaped whitish marks above; wings small; abdomen long and very thin.

4. *Tremex columbia* Say is very destructive here to old beech and maple trees, especially such as are isolated and growing along road sides, or have received gashes or injuries of the bark. The Rev. V. Clementi has recorded (vol. 1, page 29) the issue of specimens from oak firewood which had been placed near a warm stove. The date of the occurrence is not given, but as the number containing the account was published on 16th Nov., it probably occurred a month earlier. Dr. Packard (Bulletin No. 7, "Insects Injurious to Shade and Forest Trees") infers from this that the insects mature in the autumn and hibernate as imagines. I can find no mention of them emerging (under natural conditions) late in the season, although they must often do so, as shown by the following instances. On the 9th of Oct., 1880, I found one ovipositing in an old beech. Knowing that the tree had for some time been much infested by these borers, I made a careful examination of it, and soon saw the mandibles and a portion of the head of some insect which was gnawing its way through the bark. This operation I hastened with the aid of a pocket-knife, and found that it was another large female. Last month (Oct.) I kept a careful watch for these insects, to ascertain, if possible, whether their appearance at such a late date had been an exceptional

event. On the 1st I found one upon the plank-walk of one of our streets, and on the 9th a second under some maples bordering another street. The following day I went specially to visit some old maples which are a favorite resort of these insects, and captured upon one of them a female in the act of ovipositing, while upon the same tree were the bodies of three or four which had evidently very recently perished in the performance of such act. In another tree were a number of holes from which specimens had apparently but lately emerged. Although this species is so common, I have not yet captured a male (nor even seen one except in a collection), yet Dr. Harris, if I remember correctly, describes them as swarming around the ovipositing females. I may here add that on the 30th Sept. I saw one of their chief enemies, viz., a fine female *Rhyssa lunator* Fab., flying actively about.

5. *Urocerus nitidus* Harris. The abdomen of this species terminates in a triangular point like that of the preceding one, and very unlike the long spear-shaped horns of the two following. The females agree in nearly all respects with that described by Kirby (see vol. ix., page 148) as *Sirex juvenicus* Linn., but the antennæ are longer than the head and thorax, instead of "shorter than the thorax." Harris describes it, however, as differing "from the European *U. juvenicus* in the much greater brilliancy of its color and in having shorter antennæ." The female is a handsome insect of a deep greenish-blue color; the head and thorax rough and hairy, but the abdomen smooth and glossy; the antennæ are black and the legs yellow. Harris states that the males are unknown, but I have been so fortunate as to secure several. The head, antennæ, thorax and four anterior legs resemble those of the female. The posterior pair of legs are much swollen, and are black, with the exception of the thighs. The abdomen is flattened; the fourth, fifth, sixth and seventh segments are of a deep orange, or reddish-yellow color, and the last segment is less sharply pointed than that of the female. This species appears to be most abundant in the latter part of Sept. and the beginning of Oct., during which period I captured ten females and three males, as follows: Sept. 21st, female; 23rd, male and female; 24th, female; 26th, female; 29th, 2 female; 30th, female; Oct. 1st, male; 2nd, male and female; 8th, female; 18th, female. I have also two males of which the date of capture is not recorded. They were taken about the beginning of Sept. The females measure from three-fourths of an inch to one and one-eighth

inches in length ; the wings expand from one and one-eighth to one and three-fourth inches. The males are from nine-sixteenths of an inch to one and one-eighth inches long, with about the same expanse of wing. All the above specimens were taken in the city, generally in the morning upon the sidewalks or fences. The majority of them were under or near maples, and one was taken upon a tree box, which has led me to think that they may perhaps attack these trees, although I could find no evidence of their having done so. Probably they may have issued from the pine timber or lumber of which there is so much about the city.

6. *Urocerus albicornis* Fab. I captured a female of this species on the 22nd of Aug., and another on the 26th. Both specimens were taken in the centre of the city, and about the same time other specimens were observed flying up and down the street. One was seen to hover for some time about a telegraph pole, and all the specimens seen were within fifty yards of this pole. The insect was at some distance above the ground, so that the pole at that point could not be inspected. The presence of the insect on it may have been accidental, and all the specimens may have flown from the lumber yards.

7. *Urocerus bizonatus* Stephens is a handsome species, larger and stouter than the preceding one and readily distinguished by its yellow legs and antennæ, the yellow lumps behind the eyes, and the two yellow bands across the abdomen, from which it derives its name. I cannot yet record it as occurring here, although one day about the end of Aug. I saw upon a house a *Urocerus* which appeared to be this species. It flew away, however, before I could closely observe or capture it. There is a specimen in the collection of the late Mr. Billings, but it may not have been taken here. Kirby (vol. 7, page 159) records it as taken in Lat. 65° and on the journey from New York. I have received from British Columbia two fine specimens taken by Mr. A. J. Hill, C. E., Can. Pac. Ry. Kirby gives the length of his specimens as eighteen lines and their expanse of wing as twenty-five lines. These are the measurements of my larger specimen ; the length including the ovipositor, without which it is only an inch long. Has the male been described? I imagine it must be very similar in appearance to the specimen described by Harris as *U. abdominalis*.

The males of all the species seem to be rare, even those of our commonest species being seldom seen.

Not having a monograph, or even a catalogue of the Uroceridae, nor access to a good entomological library, I do not know how these insects are at present classified.

A CARD.

After twenty years work on North American Moths, and being more or less constantly employed in determining material, I find my time so taken up with it that it excludes other occupation. From this fact, and the expense and time demanded by the necessary correspondence, I am obliged to make a charge for my labor. All specimens will be returned in future, and a charge of ten dollars per hundred or ten cents a specimen will be made for labelling them, exclusive of transport and postage.

A. R. GROTE, New Brighton, Staten Island, N. Y.

October 1, 1882.

ALYPPIA OCTOMACULATA.

BY H. H. LYMAN, MONTREAL, P. Q.

Last June I was in Boston, from the 14th to the 30th, and during this time *Alypia octomaculata* was in season and very abundant. Had I chosen to carry a net in the public gardens and uptown streets, I suppose I could have taken a couple of hundred specimens, always provided that I wasn't "run in" as a lunatic. As it was, I contented myself with carrying a supply of pill boxes, and succeeded in taking about thirty-five specimens. During two days I was visiting a friend about seven miles from the city, but did not see a single specimen of this species; but in those streets in which there were small plots of grass in front of the houses, they were very common. The spot where I took the most of those I captured was a plot of grass about ten feet by seven, in which there was a *Syringa* between two *Deutzias*, both species of shrubs being in blossom. The *Alypias* constantly frequented the latter, and were then easily taken with a pill box, but though they occasionally alighted on the leaves of the *Syringa*, I never saw them visit the flowers.

DESCRIPTION OF THE PREPARATORY STAGES OF
PYRAMEIS ATALANTA, LINN.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Barrel-shaped, the ends narrowing equally and rounded; the base flattened over a little space; from the edge of this start nine vertical and straight ribs, at first low, but gradually rising in elevation and after the middle rapidly, till at the top they are very prominent, and terminate abruptly about the rim of the depressed summit; these ribs are thin and grooved on both sides perpendicularly to the surface of the egg; between them the surface is a little excavated, and smooth; color green. Duration of this stage 5 days in May, 3 to 4 in July.

YOUNG LARVA.—Length .08 inch; cylindrical, tapering posteriorly from 4th segment; each segment rounded; color greenish-brown, semi-translucent; furnished with ten rows of black curved hairs, of which two are close together on middle of dorsum, two are lateral above spiracles, one is partly in line with, partly below spiracles, and one below this; on 2 is a sub-oval black chitinous patch, with four hairs on either side the medio-dorsal line, three others in vertical line below the patch; 3 and 4 have five hairs on each side in vertical line, but from 5 to 12, while there are five hairs, they form two lines, the 1st, 3rd and 5th being in front part of the segment; the anal segment shows two hairs on the side, and a black dorsal patch, on either half of which are about five hairs; two small hairs over each foot and proleg; on 2 to 4 the hairs are curved forward, on the other segments back, but on all the lowest row is turned down; so on 2 to 4 the next row is turned down; head rounded, black, with a few black hairs. Duration of this stage in May 4 days, in August 3.

After 1st Moulting.—Length .12 inch; wholly black-brown; armed with 7 rows of short, slender, branching black spines, head rounded, bi-lobed, the vertices rounded, black, thickly covered with simple, irregular-sized black branching spines, each ending in black hair; on 2 is a chitinous dorsal bar with simple spines. Duration of this stage in May and August 2 days.

After 2nd Moulting.—Length .3 inch; very nearly as at preceding stage. To next moult 2 to 4 days.

After 3rd Moulting.—Length 4 inch; color more black; each segment several times creased and on the ridges so caused are many minute whitish

tubercles ; in line with spiracles a macular greenish-yellow band, more or less pronounced, the spots or patches lying on either side the junctions of the segments ; the spines longer in proportion than before, but slender, and black ; head brown. To next moult 3 days.

After 4th Moult.—Length .6 inch ; in from 3 to 4 days the larva reaches maturity.

MATURE LARVA.—Length 1.3 inch ; cylindrical, obese, the middle segments much thickened, all well rounded ; color usually velvet-black, thickly sprinkled with fine yellow points, caused by little tubercles ; in line with spiracles a series of greenish-yellow patches lying on either side the junctions of the segments, and forming a macular band ; but this is variable, sometimes being obsolete, or nearly, at others nearly, and even quite, continuous ; under side smoky-brown ; armed with 7 rows of moderately long, slender, branching spines, which are usually black ; but in some examples are pale yellow-white, and more or less reddish at base, especially on anterior segments ; one of these rows is dorsal, three lateral ; the dorsal spines run from 5 to 12 ; the 1st lateral from 3 to 13 ; the 2nd lateral from 3 to 13 ; the 3rd from 5 to 12 ; besides these are smaller spines along base and over feet ; on 2 is a collar of 12 small spines, 6 on dorsum, 3 on either side ; feet black, pro-legs smoky-brown ; head rounded, bilobed, the vertices rounded, thickly covered with sharp conical black simple spines, of varying size, each tipped with black hair ; color dull black. From 4th moult to pupation 5 to 6 days.

Chrysalis.—Length .85 to .95 inch ; cylindrical, the abdomen stout ; head case moderately produced, bevelled transversely and equally on both sides, the ocellar projections not prominent ; mesonotum high, rounded, and bears on summit a small nose-like ridge ; the dorsal tubercles rather large, more or less gilded, the lateral, in two rows, minute, black ; color varies ; usually reddish-gray, more or less densely reticulated with black ; the lighter colored caterpillars make light colored chrysalids—greenish-gray with usually a bronze sheen over dorsal area ; this is sometimes seen in the darker examples ; the whole surface covered with a delicate bloom. Duration of this stage about 7 days.

There is much variation in the color of the caterpillars after 3rd moult. What I describe above I have found to be the usual color at Coalburgh. But some examples have the whole upper side spotted with yellow, covering fully half the surface ; others are yellow-green, more or less specked brown, and sometimes there are patches of brown on the

sides. Usually these last have a confluent, instead of macular, yellow band, along the side, and the spines are always light, whitish, or yellow-white, with or without red at base. So the head is brown instead of black in these green examples, and many of the spines on head are white.

But English authors describe the larva of *Atalanta* as considerably unlike the foregoing.

Mr. Stainton, Manual Brit. But., 1857, gives it as "yellowish-gray, with a pale yellow lateral line," and says nothing of any other color.

Westwood & Humphreys, in Brit. But., p. 55, say: "The caterpillar is of a dusky green color with a yellowish dorsal line and also a pale line on each side above the feet."

Mr. Edwin Birchall, in Ent. Mo. Mag., vol. 13, p. 210, 1877, writing from the Isle of Man, says that the butterfly is very common there and almost everywhere in the British Islands, and that in the Isle of Man the larvæ had swarmed in every lane, in 1876; and goes on to say: "The larva varies in color remarkably, but may generally (perhaps always) be classed under one or other of the following descriptions, and yet the color of some of them is so far intermediate that the variation can scarcely be called simply dimorphic.

"1. Ground color gray-green, varying to dingy white, the lateral stripe not very distinctly marked. *This is, I think, the typical form, and the only one that I have seen in England.*

"2. Ground color intensely black, the lateral stripe white or yellow."

Now it is a noticeable fact that my larvæ at Coalburgh were nearly all black in last stage, the lateral stripe usually macular, and greenish-yellow. A few examples were yellow-green instead of black, about 5 per cent. of the whole, and in these the lateral stripe was more continuous than in the black ones, and about 5 per cent. were mottled black and yellow. Here were three distinct types of larva. I have noticed the same thing in larvæ of previous years here, but how it is in other parts of the United States I do not personally know. Dr. Harris says: "The full grown ones are generally of a brown color more or less dotted with white." Mr. Birchall says the British type is gray-green varying to dingy white. This last color I have never met with, and the other authors quoted lead me to believe that the usual color is gray-green, or yellow-gray, or dusky green, but not black. Whereas so far as I know, the American type is black, and the gray-green or yellow are the exceptions.

Mr. Newman also says that the females of *Atalanta* have a small round

white spot in the scarlet band on fore wings. Mr. Birchall, however, says : " The white spot sometimes found on the upper surface of the scarlet band is not indicative of the female sex ; it was present in about one tenth of the specimens (he raised upwards of 100 butterflies), was produced from both forms of larvæ, and in about equal numbers of both sexes. It varies greatly in size, in some specimens being a barely discernible speck." None of my butterflies, at Coalburgh, showed this white spot, nor have I any example from any locality which shows it. I asked Mr. Lintner to examine his specimens and report on this spot. He writes : " I have but five, and one of the females has an extra white spot in the band in the second median interspace."

Atalanta is one of the few species of butterfly which are found the world over. In West Virginia, there are three broods of the larvæ, the first in May and early June, the second in July and early August, the third late in September, and the butterflies from the last larvæ hibernate, hiding probably in hollow trees, crevices of outhouses and barns, perhaps among rocks, ready to come forth in warm days of winter or early in the spring. I always see them about the wild plum blossoms, which are almost the earliest of the year. In two or three years of the last fifteen, it has been an easy matter to find the caterpillars in considerable numbers, but the present season, 1882, has been remarkable over all for their great abundance. I brought in, one day with another, in June, at least 150, and could have had a thousand. We have here Nettles, *urticæ*, which the books mention as the food plant of this species, but the False Nettle, *Boehmeria cylindrica*, is almost invariably selected by *Atalanta* ♀ for depositing her eggs. *Grapta Comma* feeds on the same plant in preference to nettles, and sometimes *G. Interrogationis* larvæ are found on it also. The winter of 1881-82 was exceedingly mild, and apparently the mildness was the cause of great destruction of hibernating butterfly larvae and chrysalids, in this section. Experiments show that larvae of *Argynnis* and *Satyrus* kept at a low artificial temperature through the winter months are healthy, and it is to be presumed that mild weather, which allows but semi-torpidity, and more or less activity, must be disastrous in many cases. Besides, a mild winter encourages predaceous insects, spiders, birds, etc., which destroy larvae and chrysalids. Certainly butterflies were never so scarce since I have collected, as in the season just past, and many species usually very common here were altogether wanting. In the case of hibernating imagos, a mild winter may not be unfavorable for their

preservation. They are supposed to be well out of reach of many sorts of enemies in their hiding places. Some years ago, the late Dr. L. K. Hayhurst, in charge of a construction force on one of the railroads running south from Sedalia, Mo., wrote me that his men had cut down a hollow tree, which broke with the fall and disclosed quite a number of butterflies, of different species, in hibernation. For myself, I have never seen a butterfly in that condition.

The larvae of *Atalanta* are remarkable for the construction of cases or pouches in which from the first stage to last they live concealed, and finding them so plenty, I set myself to watch their operations. But first I read up the history so far as books at my disposal gave it. The accounts in these books are very meagre, and but half correct. The fullest is given in Newman's Nat. Hist. of Br. But., pp. 62-3, where we read: "The egg is solitary, laid *here and there on the leaves* of the stinging-nettle; almost immediately after emerging from the egg, the little caterpillar *draws together the leaves* of the nettle and feeds in concealment; as it increases in size, it requires more space, and *continues to increase the size of its domicile* up to the period of pupation; I have never met with it feeding exposed. . . . When full-fed, it constructs a somewhat more elaborate retreat; it gnaws through the petiole of a leaf, or eats the main stalk of the nettle within a few inches of the top, not quite separating it; the part thus almost separated falls over and completely withers, and *this withered portion is formed into a compact retreat*, secured from casualties of weather and from the inspection of birds; *from the roof of this the caterpillar suspends itself* . . . and in two days becomes . . . a chrysalis," &c. (The italics in all the quotations given are mine.)

Dr. Harris, Ins. 1862, p. 294, says: "It deposits its eggs in May *upon the youngest and smallest leaves of this plant* (Nettle), not "here and there," as Newman has it, "*being cautious to drop only one upon a single leaf*, As soon as the caterpillar is hatched, *it spins a little web to cover itself, securing the threads all around to the edges of the leaf, so as to bend upward the sides and form a kind of trough in which it remains concealed. One end of the cavity is open, and through this the caterpillar thrusts its head while eating. It begins with the extremity of the folded leaf, and eats downwards, and as it gradually consumes its habitation, it retreats backwards, till at last, having, as it were, eaten itself out of house and home, it is found to abandon its imperfect shelter, and construct a new one. This is better than the first*; for the insect has become larger and stronger, and withal, more

skilful from experience. The sides of the larger leaf . . . are drawn together by silken threads, so that the edges of the leaf meet closely and form a light and commodious cavity, which securely shelters and completely conceals the included caterpillar. This in time is eaten like the first, and another is formed in like manner. At length the caterpillar, having eaten up and constructed several dwellings in succession, and changed its skin three or four times, comes to its full size, leaves off eating, and seeks a suitable place in which to undergo its transformations," &c. "The butterflies from the first brood appear in July, and from the second in September" (in Mass.)

Mr. Scudder's account is very brief, *Butterflies*, p. 110: "The caterpillar constructs a somewhat similar though more perfect nest (i. e., than what is called a Tiger Swallow-tail,—whatever that may be, some Asiatic species we may suppose), by fastening together the opposite edges of a nettle-leaf, the tip of which it eats *when too lazy to go from home*, until there is barely enough left for shelter; *its weight causes the leaf to droop, so that the nest is easily discovered.*"

The only information contained in Westwood & Humphrey's *British Butterflies*, 1848, on the habits of the larva of *Atalanta* is this: According to Sepp., the caterpillar, after it is hatched, selects a Nettle-leaf, which it draws together with threads into a roundish, hollow form, leaving for the most part *an opening into the interior both before and behind*, thus serving both for shelter and food until almost devoured, when it selects a fresh leaf, and proceeds with it in the same manner, one caterpillar only being found on a single leaf, thus indicating a peculiar liking for a solitary life."

Boisduval and Leconte, 1833, say: "It lives isolated on Nettle, and is almost constantly concealed between many leaves drawn together by some threads."

(To be Continued.)

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Page 218.)

CAMPOMETRA AMELLA Guen., 3, 25, pl. 18, fig. 8.

This genus and species I have accidentally omitted from the "New Check List." I have never identified the species with certainty. For

some time I have conjectured it was the same as *Eubolina Stylobata* Harvey. With regard to the genera separated from *Homoptera* by Gueneé, I have merely insisted on the validity of *Zale* in former papers. But I am averse to throwing them together until we know the early stages upon which Gueneé seems to have relied, using Abbot's drawings. Another reason with me has been (as I have pointed out) that *Homoptera* is a term used in another Sub-order of Insecta. Probably *Pheocyma* will have to be adopted, as the insect I have identified as *Lunifera* (figured by Gueneé) does not seem to me to differ generically from our other species arranged under *Homoptera*.

The type of *Eubolina Impartialis* recalled to me the *Homoptera Stylobata* and *Mima* of Harvey, by the less completely lined secondaries, and I have grouped the species near *Homoptera*, where I am satisfied they are better placed, though probably higher than *Homoptera* and leading to it. Unfortunately I made no study of the genus and cannot be certain that the forms are correctly associated. *Impartialis* will probably occur in Texan collections; when I receive a specimen I shall examine it with a view to settle its relationship with *Campometra* and the species referred to *Eubolina* in the "New Check List." Among the genera I have never seen and which I cannot form any opinion upon from the descriptions are *Thaumatopsis* and *Homophoberia*. Although Mr. Smith does not mention *Cilla Distema*, I do not think this can be the former. Mr. Smith seems to have published his "Synopsis" without knowing a large number of my generic types. But he seems to have all of Mr. Morrison's, and, while following my reference of *Eutricopis* to *Melicleptra*, he rehabilitates *Eucalyptera* as distinct from *Scolecocampa* on the position of the labial palpi; this did not seem to me essentially different, and the two insects have as close a general resemblance as *Plagiomimicus* and *Polenta* and agree in other characters almost exactly; I cannot now re-examine them, but as the claw on the front tibiae of *Tepperi* is overlooked by Mr. Smith, and the exposed cup-like clypeal structure of *Plagiomimicus*, I feel certain that the "Synopsis" is both unreliable and partizan, and the determined use of Boisduval's and Treitschke's genera when they have not the sanction of priority, confirms my belief that it is written with a bias. Every omission to make a complete and faultless diagnosis on my part is made much of, while the generic descriptions of other writers, wanting in every point: such as accuracy of statement, circumstantiality, completeness, comprehension of the real affinity of the type (e. g. *Polenta*, etc.,) are

passed upon as if already well described. So that it seems to me that Mr. Smith's refusal to recognise certain proposed genera is not the result of their want of given characters but of their authorship. Genera such as *Rhododipsa* (not "Rhododispa," and of the few names, "Hypsoropta," "Autoplaga," "Pangrapha," "Pseudoglossa," "Lepidomis," "Nolophana," "Panapoda," "Melicliptria," "Macrohypena," "Shinia," etc., are by Mr. Smith wrongly written) Bull. U. S. G. Surv., vol. 3, 797, are sufficiently described when the eyes, tibiae, clypeus and palpi are noticed comparatively. But an author who considers the color of *Sanguinea* and *Florida*, and their pattern, the same, must be manufacturing his case or be possessed of an honest disregard of differences. Here, also, Mr. Smith unites *Porrina* and *Rhodophora*, although, joined to other differences of armature and vestiture, the palpi are "horizontal" in one case and slightly "drooping" in the other. The palpal difference is *all*, so far as I can see, to separate *Eucalyptera* from *Scolecocampa*, and yet Mr. Smith considers them beyond question distinct, while *Porrina* and *Rhodophora* are united. I do not verify even this palpal difference of *Eucalyptera* and cannot consider the genera distinct. As to *Metahadena* it appears now that it has a claw, and the distinction between it and *Oncocnemis* is in order; the character is not given by its author, whose diagnosis gives no single distinctional character from *Homohadena*.

YRIAS CLIENTIS, n. s.

Size moderate, a little larger than Gueneé's figure of *Progenies*. Rather light brown with both wings crossed by a number of dark brown, nearly equally distinct, transverse lines, a little uneven and oblique, bent superiorly; the median lines most distinct. On costa the dark costal dots are relieved by a pale yellowish shade, obtaining especially centrally. An apical black V-shaped mark, enclosed by pale streaks, giving the effect of an ocellus. Body untufted, cylindrical. Beneath paler, with three faint shade bands on hind wings and two, the inner faint, on fore wings. Fringes brown. Arizona. *Expanse* 28 mil.

YRIAS REPENTIS Grote.

I referred this species originally to *Homopyralis*, but it rather belongs to this genus, not previously described from North America. This species is known by the running inwards of the t. p. line. *Expanse* 26 mil. Arizona.

YRIAS CRUDELIS, n. s.

♂ ♀. Smaller than the preceding; of a more blackish brown color. The subterminal line is inaugurated by a black shade picked out by a following clay-colored edging. The t. p. line is edged on both sides by a similar clay-colored costal shade, and there is a light spot on cell in place of reniform. The median shade is diffuse inferiorly. The lines are dark and tolerably distinct, relieved at the middle of inner margin of secondaries by a pale shade. Beneath glistening, not much paler than above. *Expanse* 20 mil. Arizona. Coll. B. Neumoegen, Esq.

A number of specimens, varying but little in size or appearance.

(To be Continued.)

A NEW STATE ENTOMOLOGIST FOR ILLINOIS.

Prof. Cyrus Thomas, to whom we are indebted for six out of the eleven valuable reports which have been issued by the State of Illinois on noxious and beneficial insects, has removed to Washington, and Prof. S. A. Forbes, of Normal, Illinois, has been appointed State Entomologist in his place. We heartily congratulate Prof. Forbes on his well-deserved promotion, and also congratulate the authorities of the State in that they have secured the services of one so competent, thorough and painstaking as Prof. Forbes has shown himself to be in his published papers on natural science.

DESCRIPTION OF A DIPTEROUS PARASITE OF PHYLLOXERA VASTATRIX.

*DIPLOSI? GRASSATOR, n. s.

BY REV. T. W. FYLES, COWANSVILLE, P. Q.

LARVA, one-tenth of an inch in length—pointed at the head—rounded and blunt at the hinder extremity. First three segments the color of amber, and semi-transparent: the rest of the body salmon-colored. Nine sets of hooks, or tentacles, in place of feet, the two first in pairs, the remainder in threes. The larva has the habit of holding itself erect, by means of peculiar anal protuberances which seem to cling by suction. The

*This insect is referred to the genus *Diplosis* in deference to an opinion expressed by Prof. C. V. Riley, when in Montreal in August last.

body has minute hairs thinly scattered over it. On the sides of the head, which is small and black, there are bristle-like palpi, pointing forwards. The larva is full fed by the end of August.



Fig. 25.

In the accompanying figure, drawn by myself from nature, the larva is shown at *a*, the pupa at *b*, and the imago at *c*, all highly magnified. The natural size of the perfect insect is given at *d*.

PUPA, dark brown, about 9-100 of an inch long. The antennæ cases form a striking feature, projecting on either side about one-sixth the length of the pupa, and giving a flattened appearance to the head. A pair of setæ mark the position of each spiracle, and there is a rounded protuberance at the hinder extremity.

IMAGO.—*Wings*, semi-transparent—beautifully opaline—three-ribbed—having the form of the blades of a propeller—fringed with long hairs. Balancers conspicuous. *Antennæ*, setaceous, 24 jointed, having a circlet of hairs around each joint. *Eyes*, large and black. *Thorax*, reddish brown, with a peculiar hump on the back, behind the wings. *Legs*, long and hairy. *Abdomen*, salmon-colored—has two lines of hairs extending lengthwise on the under side. The perfect insect appears early in September.

[This insect was reared by us about the same time as those by Mr. Fyles. It was very common in the neighborhood of London this year, infesting the gall-inhabiting type of the Phylloxera. The following notes in reference to it may be of interest, omitting the description already so well given by Mr. Fyles :

About the middle of August my attention was directed to the foliage of some grape-vines, Clinton and other varieties, which were suffering from an attack of the gall-inhabiting type of Phylloxera. On opening some of the older galls they were found to be free from living lice and occupied by one, or in some instances two, small, brown chrysalids, and a number of the empty skins of the young lice. On further examination many of the galls were found to contain the larvæ of this same insect.

The egg is deposited by the parent fly in the gall, or at its entrance. Each gall is usually occupied by several full grown lice, and from 50 to 500 minute yellow eggs, which are gradually deposited and as gradually hatched. The young larva of our new found friend is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. We could find no evidence of its attacking the parent lice, as long as the newly-born and tender progeny were in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two were found in a single gall; but in no instance have we found living lice with the chrysalids, an evidence that this insect does its work thoroughly. A sufficient number of galls have not yet been examined to determine with any accuracy the proportion occupied, but they appear to be sufficiently numerous to materially check the increase of this destructive pest.—[ED. C. E.]

CORRESPONDENCE.

DEAR SIR: In the last number of the CANADIAN ENTOMOLOGIST, at p. 219, by the omission of quotation marks at the beginning and end of the piece of poetry, I am credited with the authorship of these lines. This is a mistake; my signature should have come after the word ENTOMOLOGIST on the previous page, and the whole of the subsequent part is a quotation from the Dublin Penny Journal. By making this correction as soon as possible, you will greatly oblige yours truly, J. FLETCHER.

DEAR SIR: In reply to Dr. Hagen's note I would say that Staudinger's *errata* does not alter my position (which can be proved by Staudinger's preferring *Scabriuscula* to *Pinastris*—I took the *Papilio* as better known), but merely shows that he would have still preferred *Sinon*, if *Podalirius* had not really been "*Vetustius*." A reference to Staudinger's "Preface" proves his position and my own. If this note of Dr. Hagen's is intended as a *quid pro quo* by the good Doctor for my finding himself and Mr. W. H. Edwards insufficiently citing Ochsenheimer, I don't think it a success. *Habet?* A. R. GROTE.

Rev. W. J. Holland, of Pittsburg, Pa., wishes to correspond with any one in Canada desiring to exchange Coleoptera or Lepidoptera.

DEAR SIR : In a recent number of the CANADIAN ENTOMOLOGIST is a short note by Mr. J. Alston Moffat, part of which concerns two species of *Cyllene*, *pictus* and *robinia*. As there appears to be some difficulty in properly distinguishing these species, it is probable that a note in the ENTOMOLOGIST would assist in making more generally known the characters published by me a short time since (Trans. Am. Ent. Soc., 1880, p. 134, pl. ii., fig. 8).

If we examine the under side of the two species, noting the form of the prosternal process, it will be observed that this in *robinia* is nearly square, so that the front coxæ are moderately widely separated. The second joint of the hind tarsi is densely pubescent over its entire surface. The male antennæ are rarely longer than three fourths the length of the body, and but little if any stouter than those of the female. Generally the W-band nearly always joins the transverse band at the suture.

C. pictus, however, has a narrow prosternum, nearly twice as long as wide. The male antennæ are much stouter and at least a fourth longer than the body. The W-band rarely joins the transverse band. On the hind tarsi the second joint is nearly glabrous along its middle.

The two species differ also in habitat and time of appearance, *pictus* living in the hickory and appearing in early spring, while *robinia* bores the locust and appears in the autumn. Hoping these few notes will prove acceptable to your readers, I remain, yours truly,

Philadelphia, Dec., 1882.

GEO. H. HORN.

A CORRECTION.

In the October (1879) number of the CANADIAN ENTOMOLOGIST appeared a short note by the writer on the larvæ of *Lachnosterna fusca*. These larvæ have, by subsequent rearing to the perfect state, proven to belong to *Allorhina (Gymnetis) nitida*.

L. O. HOWARD.

DEAR SIR : I am satisfied from a recent examination of the imago reared from it, that the larval description on page 14, vol. 12 of CAN. ENT., should apply to *Agrotis Incivis* Guen., instead of to *A. Lubricans* Guen.

G. H. FRENCH, Carbondale, Ills.

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